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EUCALYPTUS ROSTRATA, SCHLECHT. MURRAY RED GUM.

A, flower buds; *B*, fruits; *C*, part of leaf, magnified to show venation.

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THE MURRAY RED GUM (EUCALYPTUS ROSTRATA, SCHLECHT) AND ITS KINO.

By J. H. Maiden,
Government Botanist of New South Wales and Director of the Botanic Gardens at Sydney.

Aboriginal Names.—By the aboriginals of the lower Murrumbidgee it used to go by the name of "Biall," while to those of the western interior it was known as "Yarrah," a name which it shared with some other trees. The specific name, *rostrata* (beaked), is in allusion to the way in which the operculum is drawn out to a point like a beak or snout, as shown in the figure.

Other Vernacular Names.—Besides being known as "Red Gum," it is the "Flooded Gum" of the interior of Western and South Australia. In western New South Wales it is called "Creek Gum," as it is always found near watercourses. There are several trees which grow under the name of "Red Gum" in these colonies. One of them is the smooth-barked apple, Angophora lanceolata, which, in New South Wales, is often called red gum, but most of the trees known by that name are Eucalypts. The red gum of Western Australia is Eucalyptus calophylla, while in the neighborhood of St. Vincent's Gulf, South Australia, Eucalyptus odorata goes by that name. In New South Wales two other valuable timbers also go under the name of red gum, viz.: Eucalyptus tereticornis, a tree bearing close affinity to rostrata, but it is essentially a forest timber, in contradistinction to rostrata, which is a river timber. Then the leather-jacket or gray gum, E. punctata, is also known as red gum occasionally; but the red gum par excellence of these colonies is Eucalyptus rostrata, and by way of distinction I have denoted it—on account of its most celebrated locality—Murray Red Gum.

Meaning of the Term Gum as Applied to Eucalyptus Trees.—We have a very large number of species of the protean genus Eucalyptus, and they differ very much amongst themselves in (amongst other things) their barks. Some of them have rugged, dense, hard barks, and are known as "iron barks." Others have very fibrous barks, which strip off in long pieces, and even sheets, used for roofing in the country; these are called "stringy barks." Others have woolly, matted barks, and are known as "box." All these, and many others, belong to the rough-barked Eucalypts. But others have smooth barks, smooth as a planed board, and go by the name of "gums" or "gum trees." Now the rough-barked species produce gum (kino) as abundantly, and often more so, than the smooth-barked ones, but the stain of the gum is more apparent on the latter, and that is why, I believe, the term "gum" has come to be exclusively applied, in common parlance, to the smooth-barked forms.

Having distinguished these two great classes, the "gums" are still further discriminated by means of various adjectives, some referring to color, *e. g.*, "white," referring to the color of the bark; "blue," referring to the tint of the bark or the glaucous appearance of the leaves; "red," referring to the color of the wood, and so on. And, inasmuch as we have several red gums, I have proposed to permanently define E. rostrata as "Murray red gum," for the reason already indicated. "Red gum" being thus the name of the tree, "red-gum kino" becomes the name of its product, in spite of its apparent tautology. It should strictly be written "red-gum kino" —not "red gum-kino."

How Red-Gum Kino Is Collected.—The manner in which the kino is procured is as follows: The men employed in getting it look for the trees from which the substance is or has recently been exuding, and cut into the tree until they get beyond the gum-vein; they then insert a piece of tin (trough-shaped) into the cut or hole, and let the kino run into a bucket or kerosene tin.[1]

[1] Kerosene tins are rectangular in shape, and hold about 2 gallons; in them the kerosene (called paraffin oil in England) is imported from the United States, and the kerosene, in these original packages, finds its way into the remotest parts of the colonies. When the top is cut off and a wire handle fixed across, we have a rough-and-ready pail, which is used in Australia for many purposes of collection and storage, such as the case we have under consideration now.

When the kino exudes it is of the consistency of molasses, and has a sourish odor. In a few days it dries into a solid mass, which subsequently becomes quite friable. It is owing to this property (shared by other kinos of my "turbid group") that it cannot be collected in an indurated condition by simple picking from the bark of the trees, as can kinos belonging to my "ruby" and "gummy groups," which do not become friable with age.

As much as 4 gallons have been procured from one tree, but this is exceptional. On an average, not more than 1 quart per tree is obtained, and from the majority of trees no appreciable quantity of kino is obtained by tapping. Many are all but free from it.

The usual price paid on the Murray River at the present time, for liquid kino (before induration) is 7d. per pound, and a large quantity could be forthcoming at that price, if a steady demand were to set in for it. A good workingman can procure between 10 and 12 pounds per day of the liquid kino. It loses but little weight in drying.

The kino of the red gum is perhaps the best known of all Eucalyptus kinos. The following notes of it were published by me in the *Proceedings of the Linnean Society of New South Wales* for September, 1891:

It is a useful astringent, and it seems to be increasing in favor with medical men in England, America and Australia.

The official kino (Pterocarpus) contains, I believe, no substance which is not contained in this and some allied kinos, for which they appear to be a perfect substitute. See *Pharm. Jour.* [3] **20,** 221, 321.

The kino of E. rostrata will be found mentioned in all modern works on Materia Medica. In Martindale and Westcott's *Extra Pharmacopœia,* for instance, we have the following:

"E. rostrata and E. corymbosa, and probably other species imported from Australia. It is semi-translucent and garnet-colored, not so dark as, but resembling, kino in appearance, soluble in water, tough, difficult to powder [not correct as applied to these two kinos. —J. H. M.]; it adheres to the teeth when chewed, is intensely astringent to the mucous membrane, useful in diarrhœa, relaxed throats, and given with success to check the purging of mercurial pills."

But the following statements pertaining to the percentage of tannic acid and the solubility are somewhat misleading, since I have shown

the enormous variation in the properties of kinos caused by age:

"Of 100 parts, 90 are dissolved in cold water, the solution being clear; 27 parts of isinglass precipitate all the astringent matter."—Squire's *Companion to the B. P.*

Dr. Wiesner says of a sample:

"Easily soluble in water and alcohol; solution neutral, free from gum resin. Broken masses of zircon-red, sometimes light brown, mixed with bits of bark."

Following are experiments on "Red Gum" kino purchased in Sydney, November 22, 1888, of Victorian origin: In lumps up to the size of peas, though angular. Prevailing color, purplish-brown; is readily powdered between the fingers, forming an ochrey-brown powder. The mass of kino has not the brilliant appearance of the kinos of the ruby group, owing to this friability.

In cold water it dissolves fairly readily, and almost entirely to a reddish-brown liquid.

Its composition (determined November, 1888) is:

Catechin and tannic acid	84·3
Ligneous matter, etc.	·3
Moisture	15·2
Ash	·2
	100·00

Tannic acid determination (Löwenthal), 46·22 per cent.

A specimen of kino from the "Creek Gum," Tarella, Wilcannia, August 23, 1887 (diameter, 1–2 feet; height, 30–40 feet), gave the following results: it is only obtainable in rather small quantities and in rather small pieces; pale, as kinos go, very bright-looking, and of a ruby color; powders fairly readily, forming a powder of a light-brown tint. It dissolves almost immediately to a pale brownish or almost orange solution, leaving a sediment of a whitish-salmon color with a few dark-colored particles, like those of E. goniocalyx, only cleaner-looking.

Its composition, determined October, 1888, is:

Catechin and tannic acid	82·7
Ligneous matter, etc.	·6
Moisture	15·8
Ash	·9
	100·00

Tannic acid determination (Löwenthal), 47·746 per cent.

Since the above observations were made, H. G. Smith and the writer[1] have been re-examining Eucalyptus kinos. These researches have been continued by Mr. H. G. Smith.[2] From these papers it will be seen that certain kinos of the "Turbid" group contain new organic bodies, Eudesmin or Aromadendrin, or a mixture of both. All the kinos of this group (of which E. rostrata is a member) are at the present time being examined with the view to ascertain whether they contain these new substances, and in what quantities. In the first broad grouping of these kinos, Catechin was (from imperfect investigation) stated to be present.

Why Eucalyptus Rostrata Kino is Usually Chosen for Medicinal Purposes.—Because this species is very gregarious, it cannot, in the districts in which it occurs, be mistaken for any other species, and because it is a comparatively free yielder of kino. All these are important practical considerations, apart from the properties of E. rostrata kino itself. The discrimination of the various species of Eucalyptus in a forest is so difficult that considerable botanical knowledge would be required in the case of a kino collector who might be set to the task of collecting kinos true to name. As a matter of fact, such men are not available for the work of kino collecting in a mixed Eucalyptus forest.

Eucalyptus Rostrata and Its Oil.—In passing, the following notes may be useful:

The leaves of the red gum emit a pleasant odor when crushed in the hand, but the Eucalyptus oil they contain is not a regular article of commerce, as it is not yielded in payable quantity. Mr. Bosisto thus reports on it in the *Trans. Roy. Soc. of Victoria*, Vol. VI, 1861–4: "Plants grown on high ground give an oil of a dark amber color, possessing an agreeable aromatic flavor, and having the odor of caraways. The yield from 100 pounds of the fresh-gathered leaves was 1 ounce 6 drachms. The plants grown on low marshy soil yielded an oil of a pale-yellow color, in appearance and smell similar to that yielded by E. odorata, the quantity being 9⅓ drachms to 100 pounds." Last year M. Mellon, of the Dunolly Scent Farm,

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[1] A Contribution to the Chemistry of Australian Myrtaceous Kinos. *Proc. Royal Society N. S. W.*, 29, 30 (1895).

[2] On Aromadendrin or Aromadendric Acid from the Turbid Group of Eucalyptus Kinos. *Proc. Royal Soc. N. S. W.*, 30, 135 (1896).

Victoria, obtained no less than 7 ounces of oil per 100 pounds of leaves.

In Mueller's edition of Wittstein's work we find the following:

"The essential oil is pale yellow to reddish amber in color; it smells and tastes like that of E. odorata. Its specific gravity is 0·918, and it boils at 137° to 181° C."

The celebrated essential oil firm of Schimmel & Co., of Leipzig, Germany, have also examined this oil (*vide* their *Bericht* for October, 1891). Their oil was prepared by M. E. Mojon, of Algiers, from trees grown in that country. They determined the specific gravity of their sample to be 0·924 at 15° C., and the optical activity + 12° 58′ in a 100-millimetre tube. The oil has a powerful odor of valerianic aldehyde, and is rich in cineol. E. rostrata and E. globulus appear to be the only two eucalyptus oils known to contain valerianic aldehyde up to the present.

Quite recently, Mr. W. Percy Wilkinson, of Melbourne, has made a valuable preliminary investigation of the Eucalyptus oils of Victoria (*Proc. Roy. Soc., Victoria*, 1893, p. 195). Amongst others, he has examined three specimens of red gum oil, and following are his results:

Sample.	Specific Gravity.	Specific Rotation.	Refractive Index.	Specific Refractive Energy.
1	·9120	+ 8·7°	1·4604	·5072
2	·9216	+ 2·2°	1·4600	·5014
3	·9222	+ 0·5°	1·4607	·5018

None of them gave the phellandrene reaction.

Eucalyptus Rostrata. Where Found.—It is widely distributed in Australia, usually on the banks of rivers, or on river-flats subject to inundation, or in old water-courses. It becomes dwarfed in the interior; but it attains its greatest development on the banks of the Murray River, where, on the New South Wales side, there are millions of acres of land which are periodically flooded (hence the name, "flooded gum," often applied to this species), and hence unsuited to agriculture. On this land are countless millions of red gum trees, the cutting of whose timber affords a large revenue to the New

South Wales Government. On this flooded land the propagation of the tree is largely unchecked, and so the production of timber—and, indirectly, of kino—is practically unlimited.

The Murray River is a river nearly 2,000 miles long. It forms the greater part of the boundary between the colonies of New South Wales and Victoria. There is comparatively little red gum on the Victorian side, but in New South Wales territory it is very abundant.

Beyond the Dividing Range, in New South Wales, the red gum has a very wide range, being found on the banks of the Cudgegong, Castlereagh, Darling, etc. It is also sparingly found in the coast country, except from the Victorian boundary to the Bega district. In Victoria it is found on river-flats and open valleys in most parts of the colony, and in South Australia it is likewise very extensively distributed. It is also found in southwest Queensland.

The way in which the red gum (yarra) usually marks the course of water was early observed by Sir Thomas Mitchell: "The yarra grew here (Lachlan), as on the Darling, to a gigantic size, the height sometimes exceeding 100 feet. The yarra is certainly a pleasing object in various respects; its shining bark and lofty height inform the traveller of a distant probability of water or, at least, of the bed of a river or lake, and, being visible over all other trees, it usually marks the course of the rivers so well that, in travelling along the Darling and Lachlan, I could trace with ease the general course of the river without approaching its banks until I wished to encamp." ("Three Expeditions," ii, 54.)

This useful tree has been introduced into several countries (chiefly through the agency of Baron von Mueller), with varying success. For particulars of most of the results, see Mueller's "Select Extra-Tropical Plants" (Victorian Edition). For results in Assam, see *Kew Report* for 1879, p. 16; and for results in India see *Kew Reports:* 1876, p. 23; 1879, p. 16; 1881, p. 12. Vilmorin, of Paris, has distributed a good deal of red gum in Europe. Some years ago I received, from a correspondent at Oporto, in Portugal, flowers and fruits raised from such seed, with the report that the species does well in that country. The red gum has been planted by a number of people in California, and is favorably reported upon by the local forest conservator. For an account of its growth in that State, reference may be made to the very interesting monograph on "Eucalyptus," by Mr. Abbot Kinney, of Los Angeles.

GELSEMIUM.

By L. E. Sayre,

Member of the Research Committee C, of the Committee of Revision of the United States Pharmacopœia.

RHIZOMES, ROOTS AND STEMS.

Some time ago my attention was called, by members of a class in microscopy, to the varied structure of this drug. Fragments of gelsemium root, handed to the different members of the class, when sectioned and mounted, did not show the same characteristics. This observation led me to examine samples of gelsemium root from different sources, and this forced the conclusion that the gelsemium of the market is composed not only of the rhizome and root, but also of the stem in varying proportions. Furthermore, that the description of the drug, supposing it to be composed of rhizome and root—as is taken for granted by the Pharmacopœia—is somewhat ambiguous and misleading. In the present article a more accurate description of the rhizome and root, and a method of distinguishing both of these from the stem, is suggested.

I am inclined to think that the stem, present to some extent in the commercial drug, is an adulterant. Reassuring myself on this point, I sent a package of the commercial drug to Gerald McCarthy, botanist of the North Carolina Agricultural Experiment Station, asking him to report upon the same. In his response to my letter, he states: "The specimens you submit represent the rhizome and stem respectively, the latter is the specimen with the bast fibres in the cortex. The stem was apparently used to adulterate the rhizome in the original lot. So far as I know, the stem has no medicinal value."

It is an interesting question whether the stem has any medicinal virtue. An investigation has been commenced, by which it is hoped that the relative value of the rhizome, root and stem may be determined.

Collectors in the South have been applied to for authentic specimens. In the meantime the article of the market is being examined. It may be of interest to state that Mr. McCarthy, in his letter, remarks: "The parts of the plant collected here for medicinal use are roots, rhizomes, leaves and flowers."

The description given of gelsemium rhizome and root, in one paragraph, by the U.S.P., 1890, reads as follows: "Cylindrical, long, or

cut in sections, mostly from 5 to 15 millimetres, and occasionally 3 centimetres thick, the roots much thinner, externally light yellowish brown, with purplish-brown longitudinal lines; tough; fracture splintery; bark thin, with silky bast fibres, closely adhering to the

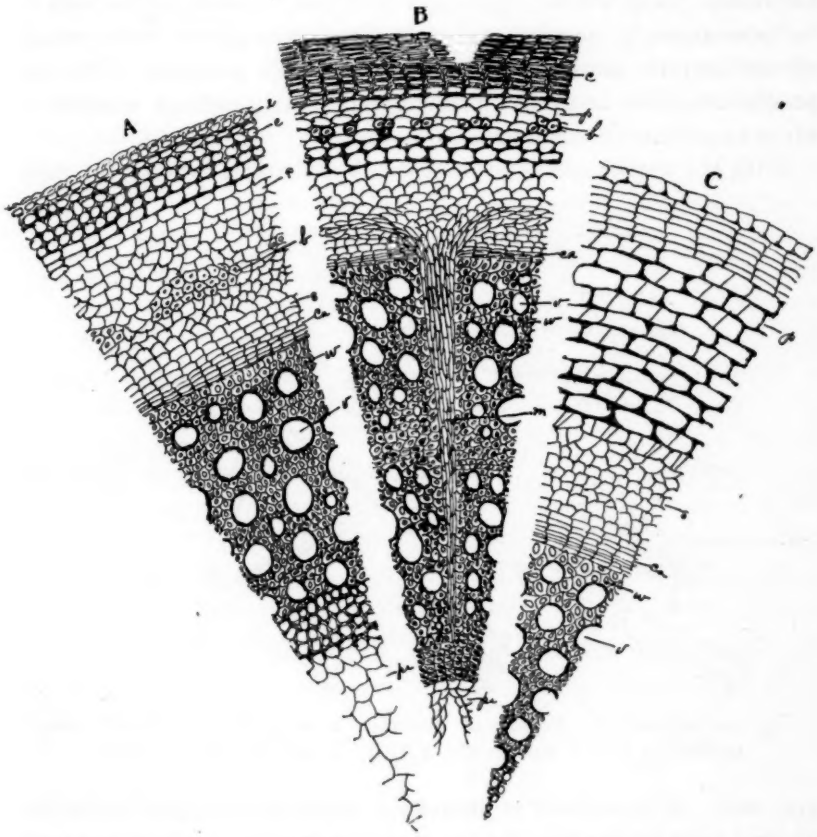

Fig. 1.—Cross-sections of Gelsemium sempervirens. *A*, stem; *B*, rhizome; *C*, root.

pale yellowish porous wood, which has fine medullary rays, and in the rhizome a thin pith; odor aromatic, heavy; taste bitter."

It will be noted in the above description that the only distinction made between the root and rhizome is that the latter has a thin pith.

Professor Rothrock (Am. Jour. Phar., 1884, p. 130) calls attention to two structural characteristics of stems and roots, which, he

says, are peculiar and of positive value. "The first of these characteristics," he says, "is derived from the medullary rays. These usually widen in a marked manner, going from centre to circumference, being sometimes much more than twice as broad externally as internally. The second characteristic is the tendency of the pith to be penetrated by several plates of large, thin-walled cells, which divide the pith more or less perfectly into four portions. This latter characteristic is always present and plainly enough marked to serve as a means of diagnosis."

This, the author seems to indicate, is a characteristic of the stem

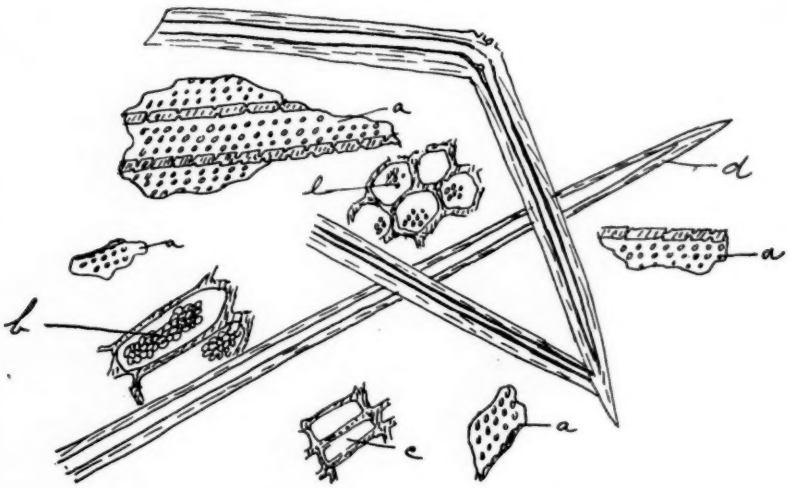

Fig. 2.—Gelsemium. Powder of rhizome. *a*, wood tissue; *b*, cell from medullary ray; *c*, cork cells; *d*, bast; *e*, parenchyma of cortex.

and root. It is possible he may have meant by the stem the underground stem or rhizome, for the stem is not official. In either case, whether the stem or rhizome is intended, the statement is inaccurate and misleading, because it does not make distinction between the stem (or rhizome) and root. The United States Dispensatory quotes this description of Professor Rothrock, and does not clear up the ambiguity and inaccuracy. None of the text-books make any more definite and lucid description of the root and rhizome of this plant.

From the growing plant and from the commercial drug numerous sections have been made and examined microscopically. The ac-

companying drawings may, perhaps, more clearly and more briefly describe these three parts of the plant than any written description can do.

In an examination of cross-sections of the stem, rhizome and root of the gelsemium, we find the following microscopical characters and difference of structure. In the stem (*Fig. 1, A*) are found comparatively large bundles of bast (*b*) near the wood, just outside the cambium. In the rhizome (*Fig. 1, B*) the bast is arranged near the corky layer, and in an interrupted ring, rather than in bundles. In

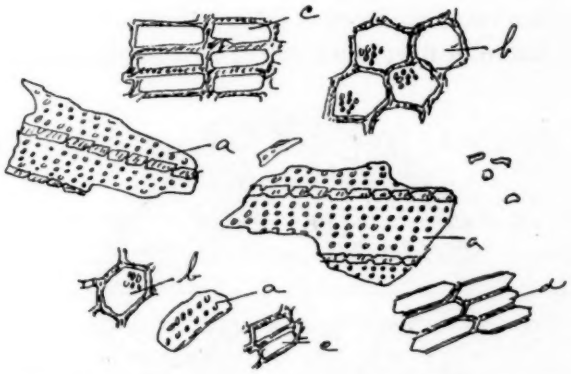

Fig. 3.—Gelsemium. Powder of root. *a*, wood tissue; *b*, parenchyma of cortex; *c*, cork cells; *d*, cambium cells.

the root (*Fig. 1, C*) the bast is entirely absent, but there are several layers of cork. The following table shows the corresponding tissues in the three plant parts:

	Stem.	Rhizome.	Root.
e,	Epidermis.	Epidermis.	—
c,	Collenchyma.	Collenchyma.	—
p,	Parenchyma.	Parenchyma.	Parenchyma.
b,	Bast.	Bast.	—
s,	Sieve tissue.	Sieve tissue.	Sieve tissue.
ca,	Cambium.	Cambium.	Cambium.
w,	Wood tissue.	Wood tissue.	Wood tissue.
v,	Vascular tubes.	Vascular tubes.	Vascular tubes.
Pi,	Pith.	Pith.	—
m,	Medullary.	Medullary.	—

Fig. 4 shows a cross-section of the pith in the rhizome; here the division into four parts is shown. It seems that, as the rhizome advances in age, the pith becomes less and less conspicuous, until

in the larger stems and rhizomes it is almost absent, if not entirely so. In this respect the stem and rhizome are much alike.

The description I have to suggest for gelsemium is as follows: Rhizome cylindrical, long or cut in sections, mostly 5 to 15 millimetres, and occasionally 3 centimetres thick; externally light yellowish brown, with purplish brown longitudinal lines; tough and woody; fracture splintery; bark thin, with silky bast fibres near the pale-yellowish porous wood, which has fine medullary rays, and a small pith which, under the lens, is seen to be usually divided into four segments.

The root is 2 to 10 millimetres thick; externally lighter than the rhizome; fracture brittle; thick bark, closely adhering to the light

Fig. 4.—Gelsemium. Pith of rhizome.

yellowish wood; odor of both rhizome and root aromatic; taste bitter.

POWDERED GELSEMIUM.

No. 60 Powder.—That the official drug is often adulterated with portions of the stem is very evident, but whether intentionally or carelessly I am unable to say. To distinguish the adulteration in powdered form has been the subject of considerable work, but with very little attendant success. The root contains no bast, and hence but a glance will indicate whether the powder be of the root or not. However, the rhizome and stem both contain the bast and in almost equal quantities, so this cannot be relied upon to distinguish between the two. It seems that neither has any characteristic cell

structure that is not found in the other. The stem, when dried, is covered with a dark brown, nearly black, layer of cork, while the rhizome is of a yellowish color. If the bark is in ordinarily coarse powder and contains a considerable amount of the stem, the dark, almost black, particles are quite noticeable; but a fine powder, or a small amount of adulteration would likely fail to show these characteristics. The ordinary micro-chemical reagents produce the same effect upon both stem and rhizome.

As before stated, the different parts—stem, rhizome and roots—are being analyzed. When the analysis is completed the results will be given.

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THE COMMERCIAL SOURCES OF LICORICE ROOT.

BY H. N. RITTENHOUSE.

While the commercial varieties of licorice root are well known to importers of the article, the qualities, values and sources of supply are no so well known to the pharmacist as they should be, if any importance is to be attached to accurately dispensing either the root itself or its preparations.

Previous to the year 1870 the principal source from which the United States obtained its supplies was Spain. Since then the consumption in the United States has increased so much that the Spanish root has been utterly inadequate to equal the demand. Other countries have since then come into the market, and now furnish the greater part of the market requirements. These countries are Southern Russia, Asia Minor (chiefly the province of Anatolia) and Syria, and about in the order above-named as to quantity, Russia being the largest exporter and Syria the smallest. Licorice root from any of the above-named sources, when good and sound, should be acceptable to the pharmacist for his uses, but it is not always good and sound in a proper sense as found in commerce.

Spanish root is gathered so closely and skilfully sorted and packed that much of it consists of fine, immature, fibrous roots, which, while they may be called licorice root, are practically worthless as such for the purposes for which licorice root is used, and besides are 50 per cent. higher in price than the other varieties; yet prejudice and perhaps ignorance on the part of some buy-

ers still demand Spanish root and Spanish extract. The Spanish root is sweeter and with less acridity than the other varieties, and if Spanish root was what it once was in mature condition when found in the market, the preference above noted might be justified; but, as it actually is, this prejudice is based on its ancient reputation, and is now unwarranted. The close digging and limited and practically exhausted fields of Spain are the causes of this.

Turning now to Russia, with its new and almost unlimited fields, as yet but lightly worked (exports from Russia only began in 1887), we find a mature root, rich in glycyrrhizin and extractive, much better suited for commercial purposes because better and cheaper than Spanish root, the sole objection to it being in the taste, which, in addition to the usual sweetness of Spanish root, has a slight acridity, which is really not objectionable, but gives the impression of being "stronger."

Anatolian root ranks between Spanish and Russian in the quality of sweetness (or absence of bitterness). In commerce no attention is paid to the botanical varieties of licorice root, and from the root alone it is quite impossible to determine its true botanical origin, the usual designations being from the countries of growth, as Spanish, Russian, Anatolian, etc.; though all varieties, except Spanish, are often classified as "Greek root," it must be remembered, too, that all licorice root of commerce is wild root, none being cultivated.

The variety in the market known as "selected" licorice root, and put up in small bundles, was formerly selected from Spanish sources, but as demand increased and supply diminished, other varieties having the requisite straightness and thickness were mixed with the Spanish, until now "selected root" consists of root from any and all sources if of the proper quality—straight, sound—and of the requisite length and thickness.

Peeled Russian root may now be prepared in Russia. I know of no reason why it should not be, but Syria formerly prepared "peeled" root for shipment to Europe, some of which found its way into the market as "peeled Russian." Any variety might be peeled as well as Russian and be just as good. It would be a satisfaction, however, to have things called by their correct names and pay for them accordingly. Peeled "Russian root" has always commanded a good price, doubtless partly on account of the cost of

the labor of peeling and careful drying; but if so much esteemed when peeled, why is it not just as much esteemed unpeeled as Spanish or any other variety unpeeled? Besides being much cheaper and richer in glycyrrhizin and extractive, for all practical purposes it is the best. Interest always attaches to a knowledge of the true sources and varieties of drugs, and is frequently a source of profit as well to the pharmacist.

Batoum is the principal port of export for the Russian root, which is gathered along the Trans-Caucasian Railroad, running from Batoum on the Black Sea to Baku on the Caspian Sea. The port of export for Anatolia is Smyrna, while the Spanish root finds its way into commerce through the principal seaports of Spain.

SECOND PAN-AMERICAN MEDICAL CONGRESS.

By Joseph P. Remington.

The second Pan-American Medical Congress met in the city of Mexico during the week beginning November 16, 1896. The first Congress assembled in the city of Washington, in 1893. The purpose of these triennial gatherings is mainly to foster the advancement of medical and pharmaceutical science, and to establish closer relations between members of the medical profession and correlative branches. The large number of delegates in attendance upon the first Congress surprised the friends of the movement, and, although the number in attendance upon the second Congress was not as large, it must be gratifying to the International Executive Committee to know that over five hundred members testified to their interest by their presence, many of them contributing papers upon some subject connected with the work of the Congress. As is customary in such bodies, the detailed work was referred to sections or commissions, the latter having been organized for the purpose of carrying on continuously important work and reporting at the triennial meetings of the Congress. Two commissions have been organized, which are of special interest to pharmacists, the Commission on Pan-American Pharmacopœia and the Commission on South American Flora.[1]

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[1] The Commission on Pan-American Pharmacopœia is organized, with Prof. Jos. P. Remington as Chairman; that on South American Flora, Prof. H. H. Rusby, Chairman.

The sections embraced the following: General Medicine, Pathology and Therapeutics, 89 papers; General Surgery, 45 papers; Military and Naval Surgery, 4 papers; Obstetrics, Gynæcology and Abdominal Surgery, 41 papers; Anatomy and Physiology, 7 papers; Diseases of Children, 16 papers; Ophthalmology, 15 papers; Laryngology, Rhinology and Otology, 3 papers; Dermatology and Syphilography, 3 papers; General Hygiene, Demography, Marine Hygiene and Quarantine, 25 papers; Diseases of the Mind and Nervous System and Medical Jurisprudence, 17 papers; Dentistry, 6 papers; Medical Pedagogics, 7 papers. In addition to these, a large number of volunteer papers were presented. The sections met in different localities, and the discussions which took place added largely to the interest of the reading.

The general sessions of the Congress were held in the National Theatre and Chamber of Deputies. A marked feature of the work of the Congress was the extraordinary interest manifested by President Diaz, of the Republic, the members of his Cabinet, and, in fact, all of the officials of the Government. Their attentions were not only directed to extending hospitality, but public and private museums and collections were freely accessible, official statistics were furnished, and every possible facility afforded for acquiring information upon any subject. The surgeons were given every opportunity to visit hospitals and chemists, botanists, mineralogists, archæologists, paleontologists, geologists and students in any of the related sciences were furnished with special guides to the valuable collections. The public and private social entertainments were on a scale of magnificence rarely approached. The subjects of permanent interest to pharmacists centre in the permanent commissions. These will be charged with the duty of investigating the Western Continent, especially the unknown South American plants, and the formulation of a plan for a Pan-American Pharmacopœia. This will not supersede the special Pharmacopæias of each country, but will collect the valuable features of each and endeavor to unify the strength of the powerful preparations, so that danger to life may be reduced to a minimum.

The richest collection of palms in the world is said to be in the Botanic Garden at Buitenzorg, Java. It contains 300 species that are determined, 100 probably new and still undescribed, and 100 varieties of known species.—*Garden and Forest.*

COMMERCIAL FERRUGINOUS PILLS—BLAUD'S FORMULA.

By William B. Thompson.

Manufacturers honestly vie with one another in an endeavor to produce this pill in an exact condition, and in maintaining its composition in a state that shall, in all respects, fulfil its therapeutic purpose or intention. Every price schedule issued lists this pill, and the quantities prescribed, sold and used exceed, perhaps, that of any other single kind except quinine.

Physicians generally believe that a constitutional effect of the iron is more promptly assured by a continued use of the Blaud composition than by that of any other form—not excepting liquid—and satisfactory results must assuredly follow where the use and popularity continue to so great an extent. Yet, if we start with the theoretical principle, and also consider the chemical action which occurs in the formation of this pill mass, that action being instantaneous, when an alkaline carbonate is brought into contact with the ferrous sulphate, and then reflect upon the sensitive and chemically unstable character of the ferrous salt formed, with its inevitable tendency towards a ferrous oxide, and finally ferric oxide, we can scarcely understand in what manner art assumes to control or retard a chemical law, postponing an action which is ultimately, if not speedily, as sure as that which governs the planetary systems. Yet it is attempted; pervious and impervious coatings are used, as means to protect the iron-salt from the oxidizing influence of air and moisture. A physical examination, and the application of a color-test to these various products of the manufactories, reveal so many conditions and appearances as to bewilder the judgment when claims to chemical accuracy are made.

The result of the first contact of the iron and the alkali in the presence of moisture is to produce a compound having a brownish green color, that of a more positive green hue being accepted as a more true product of this reaction. Then if this is accepted as the proper color indication of the true state or condition in which this ferrous salt should be presented to the human economy as a remedy, what shall we say in regard to those variable conditions as to color which the numerous commercial pills present? Shall we adopt all these as affording the proper result of a definite chemical

reaction which the originator of the Blaud pill designed? Or shall we admit that varying states of oxidation do not seriously militate against the therapeutical efficacy of this iron salt, especially when it has merged into the ferric state. In the numerous essays which have appeared upon the subject of Blaud's pills are many finely wrought theories in regard to the action of the normal fluids of the stomach, most notably the supposed free hydrochloric acid, which is fancifully conceived to be in waiting in that wondrous receptacle, ready to claim first seizure upon any congenial substance which may be ingested—with a predilection for a ferrous salt of iron—and that an insignificant amount of ferric oxide, now and then, will be but a small obstacle to the action of this solvent acid.

It would appear to be more reasonable to cease indulging in any more theories as to the precise behavior of the intestinal processes towards foreign substances, particularly medicines, or to speculate upon a probably uniform action regulating animal chemistry. But rather see to it that the state of combination is exactly such as will meet the indications suggesting its use; and that if prepared in advance of requirement, how much of chemical change or alteration can occur, and yet demonstrate it a Blaud pill, or what is its precise character as commonly found in commerce, and wherein does it differ from that of extemporaneous preparation?

This paper is presented here for the purpose of eliciting discussion. Whilst much has been written, the assertions are chiefly on one side only of the question. Now let us have the other side.

PHILADELPHIA, November 30, 1896.

ADULTERATED JAPAN WAX.

BY CHARLES H. LAWALL.

The analytical chemist, whose duty it is to examine the various commercial products sold by a large wholesale house, encounters many instances where samples are offered for examination before purchasing which are inferior in some respects to the official standard required for the substance, or which contain some unmistakable ingredient foreign to their nature.

It frequently occurs that the description of a substance is capable of several different interpretations, or the requirements are faulty,

so that the manufacturer or dealer is forced into accepting a substance which he believes to be inferior, but the impurity of which he cannot conclusively prove.

The watchful care necessarily exercised in a large establishment, where a high standard is rigidly maintained for all goods purchased, is a distinct advantage to the retail dealer, and, indirectly, to the consumer. Only those who are actively engaged in this class of work, realize the extent to which the nefarious practice of wilful adulteration is carried on.

Adulterations, according to a standard authority upon definitions, may be of three kinds:

(1) Adulteration or admixture to suit the public taste or desire in some respect.

(2) Unintentional admixture of foreign substances, due to faulty or careless methods of manufacture.

(3) Wilful adulteration for the sake of pecuniary profit.

Adulterators of the latter class are especially to be feared, as they strive to imitate the genuine product in every respect in order to obtain the full price for an inferior product.

When a fraud of this kind is detected by a prospective purchaser, he promptly rejects the goods and usually refuses to purchase further supplies from the same source. The manufacturer of the fraudulent goods offers them, in turn, to various other purchasers of large quantities, until he succeeds in finding one who buys without examining the quality of his purchase; thus, in almost every case, the goods eventually reach the consumer, who suffers the greatest loss.

The extent to which the Japan wax of commerce is adulterated, at the present time, has never before been equalled, in the case of a single commercial article, according to the experience of the writer or that of the house with which he is connected.

Fifty-nine cases of Japan wax, containing from 205 to 225 pounds each, were examined; twenty-five of these were found to be adulterated with starchy material to the extent of from 20 to 25 per cent. This means that, in the Japan wax purchased by one house, about 1,200 pounds of starch were paid for at the price of Japan wax, which is about three times as great.

Japan wax is a vegetable product imported from Japan, where it is prepared from the berries of several species of *Rhus*. The use of

this substance has largely increased during the past few years, as (owing to its low price) it replaces beeswax in many industries. As imported, it is usually in the form of rectangular blocks or cakes, weighing several pounds each; it possesses a yellowish-white color (becoming darker after age and exposure) and a somewhat rancid odor. The characteristics, taken from recent authorities, are as follows: Specific gravity, about 0·975 to 0·980; melting point, about 54° C.; saponification number, about 222.

The fraud was detected in the latter part of October, and, since that time, besides the number of cases enumerated, several samples have been offered for purchase, identical in the character and extent of the adulteration; thus showing that the quantity in the market is by no means confined to the amount named.

In every case the wax was purchased from agents or brokers in this country, direct importations, up to the present time, being free from admixture. The quotation: "For ways that are dark and for tricks that are vain," can also be applied to individuals of Caucasian descent.

The appearance of the sophisticated product differed slightly from that of the genuine wax. The specific gravity was slightly higher, and a difference was noticed in this respect when cakes of each were compared; the adulterated wax was, in most instances, free from the peculiar network of minute cracks which usually cover the surface of a cake of pure Japan wax. Upon close examination of a freshly fractured cake, a variation or gradation in its internal structure was observed; this was due to the settling out of the starch while the wax cooled. The quickest and most effective method found for distinguishing between a pure and an impure wax is as follows: A cake is fractured and the freshly exposed surface is scraped slightly with a knife; upon the application of several drops of iodine-test solution the adulterated article turns darker, becoming deep bluish black after fifteen minutes' time. The pure wax shows no alteration whatever, nor any coloration, excepting that which is produced by the iodine solution alone.

Samples for the determination of the constants were obtained by taking sections squarely across the cake, as the presence of different proportions of starch in the upper and lower portions of a cake would produce varying results were the samples taken otherwise. The averages of the constants obtained from four samples are as

follows: specific gravity, 1·0653; melting point, 52° C.; saponification number, 173·28. From pure samples examined at the same time, the following results were obtained: specific gravity, 0·980; melting point, 54° C.; saponification number, 220·98. The amount of foreign matter indicated by the lowering of the saponification number was found upon calculation to be 21·24 per cent. The starch was estimated directly by treating a weighed sample of the wax in a flask with chloroform, which dissolves the wax, but does not take up the starch; the solution was filtered, the residue upon the filter was washed well with ether, dried at 100° C. and weighed; the percentage obtained by this method of procedure was 23·42, corresponding favorably with the amount indicated by calculation from the saponification number.

A microscopical examination was made of the starch, which showed a lack of uniformity existing in the material used in different cases. In one instance it was unmistakably identified as corn starch, but in others it was difficult to decide upon the identity of the starch.

The consumers and handlers of this article will observe that they are likely to have offered to them a product which is dear at a price even considerably below the market quotation; and, as the sophistication is so easily detected, it becomes an important duty to search out and reject every case of this fraudulent material, in order to make it impossible for the originators of the compound to find a market for their product.

305 Cherry Street, Philadelphia.

PETROLATUM *VS.* VASELINE.

By Louis Emanuel.

In the advertising pages of the New York *Medical Times* the manufacturers of vaseline make the following unjust attack on petrolatum:

TO THE MEDICAL PROFESSION OF THE UNITED STATES.

We consider it our duty to inform you that when you prescribe petrolatum for a patient (in accordance with the Pharmacopœia) and have the prescription filled at the nearest drug store, you are much more likely to injure than to benefit your patient and may do him serious harm. The committee in charge of the last Pharmacopœia declined to enter therein the word "Vaseline," because it was our trade-mark, and we would not agree to surrender it, and in

place thereof invented and adopted the word "Petrolatum," which was intended to represent a substance identical to our vaseline. This action has encouraged the manufacture of worthless imitations of our product, which are sold to the druggists, the vast majority of whom neither know nor care anything about their quality, and the result is a confusion of ideas amongst physicians and failure of benefit to the patient. Now it is about time that you should clearly understand:

(1) That "petrolatum" is not "vaseline," and that the formula given in the Pharmacopœia does not and will not make vaseline.

(2) That petrolatum has come to mean a worthless and often noxious petroleum product, varying in quality from axle-grease up.

(3) That vaseline is not only useful as a vehicle (as many physicians think), but that it has extraordinary value as a remedy both externally and internally, which petrolatum has not.

These reasons ought to be conclusive, to say nothing of the fairness which should prompt honorable men to recognize those who give time, brains and money to the benefit of the world, rather than to those who live by appropriating to themselves the creations of others.

It would seem at first sight that the patentee has some rights to an unlimited monopoly, which the advertisers claim in recompense for the *brains* and *money* which has been largely devoted to the *benefit of mankind.* It appears, however, that no mortal born of woman has yet been endowed with talents sufficient to enable him to render mankind any service whatsoever without having himself first profited by the labor and brains of others. For this reason patents have only a limited existence. The wisdom of this limited monopoly is clearly demonstrated when we consider that the patentee of the process for the purification of the crude residue of petroleum distillation was not the originator of the use of animal charcoal as a deodorizer and decolorizer, and, in fact, was not the first person to apply it for this particular purpose; for Flückiger's *Pharmaceutische Chemie* tells us that "in 1847 C. B. Mansfield, Cambridge, England, patented a process for decolorizing or deodorizing petroleum sediment by means of animal charcoal; in 1865–66 R. A. Cheseborough, of New York, U. S. A., patented a process for the purpose by the use of hot animal charcoal, and in 1872 he patented the fantastic name of vaseline."

EVOLUTION OF VASELINE.

Patent No. 49,502, dated August 22, 1865, to R. A. Cheseborough, for the use of bone-black for purifying petroleum or coal oils by filtration.

Patent No. 56,179, dated July 10, 1866, to same, for heating bone-black by dry steam or otherwise, previous to using the same for filtering hydrocarbon oils.

Patent No. 127,568, dated June 4, 1872, to same, for the name vaseline.

In the latter, the claim made by the patentee is as follows:

I have invented a new and useful product from petroleum, which I have named *Vaseline*, and I do hereby declare that the following is a full, clear and exact description thereof, which will enable those skilled in the art to make and use the same.

The substance from which vaseline is made is the residuum of petroleum left in the still after the greater part of the petroleum has been distilled off. Vaseline is the product of the filtration of the said residuum through bone-black, and varies in color as it comes from the filter. First it is pure white at the beginning of the operation, soon changing to a light straw, and then a deep claret at the close of the operation.

Vaseline is a thick, oily, pasty substance, is semi-solid in appearance, unobjectionable in odor, becomes liquid at temperature varying from 85° to 110° F. It will not saponify, does not crystallize, and does not contain paraffine.

Vaseline is especially useful in currying, stuffing and oiling all kinds of leather. It is also a good lubricator, and may be used to great advantage on all kinds of machinery. It is also an excellent substance for glycerine-cream for chapped hands.

When we compare the above with the description of petrolatum of the U. S. P., we must come to the conclusion that the pharmacopœial committee is grossly misrepresented, and that pharmacy is unjustly charged with piracy.

The Pharmacopœia says of petrolatum:

A mixture of hydrocarbons, chiefly of the marsh-gas series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue when it has the desired melting point. A fat-like mass of about the consistency of an ointment, varying from white to yellowish, or yellow, more or less fluorescent when yellow, especially after being melted, transparent in thin layers, completely amorphous, and without odor and taste, or giving off, when heated, a faint odor of petroleum.

An unusually large fasciated stem of meadow thistle (Cnicus altissimus, Willd.) was sent to the museum of Purdue University a short time ago from northern Indiana. When dry, it measured 12 inches broad at the top and 3 inches at the base. The thickness of this greatly flattened stem was normal, that is, less than one-fourth inch. It was covered evenly with normal leaves, and bore a score or more of immature flower heads sessile along the upper edge. It stood 3 feet high. The interest in it lies in the size and perfect wedge form, as fasciated stems are usually irregularly developed.—*Botanical Gazette*, November, 1896.

MODERN SURGICAL DRESSINGS.

By F. B. Kilmer.

The surgical dressings in use at the present time by such practitioners as keep pace with the advancement of the surgical art are the products of the practical application of scientific knowledge. They are the outcome of the modifications and amplification of procedures that have been brought about in the evolution of surgical science.

Dr. Wm. Pepper states that "medicine and surgery have made more progress in the last twenty years than in the twenty centuries preceding." This statement may also be applied to the surgical dressing.

In the dawn of the present era of surgery, the teachings of Lister demanded that the dressings to be applied to a wound should be saturated with chemicals capable of killing germs "within the wound or coming from without." During this epoch antiseptics were empirically applied. A dressing that promised sure death to the microbe was in demand. In those days cloth was plastered with masses of pitch, paraffin fat and carbolic acid. The products were unclean—sticky, irritating and non-absorptive—directly the opposite to those in use at the present time. Crude as was this beginning, it contained the "living spark of truth that illuminated the mysterious darkness which for centuries hovered over wound infection." It brought blessings that "have soothed and removed untold suffering and misery—have saved millions of lives. For this gift to surgery we are indebted to Sir Joseph Lister."—*Gerster.*

During the decades that have followed the time of which we speak, the forward progress of the principles of antisepsis has been continuous.

The accurate scientific observations of bacteriology has determined the value of antiseptic substances, brought a knowledge of the nature of bacteria, their habits, their life, and shown their influence in the causation of wound infection. Such knowledge has given to the surgeon newer and better weapons than those first used in the combat against wound infection. The surgical dressing has always been to the front in the revolution and evolution of surgery. Caustic applications were early substituted for those which were mild, yet more potent. Many microbe-killers were found to be man-

killers; others were shown to be valueless. Power to absorb wound secretion and exclude infection was made an essential requirement for wound-dressing material.

Prevention became both the watchword and the keystone of surgical technique. What is termed by Gerster "the conscientious practice of thorough-going cleanliness," was found possible of attainment by the use of antiseptics—"angels of cleanliness." Chemical sterilization has been combined with mechanical cleansing. Natural agents, as well as those instituted by the operator, have been called to the aid of the surgeon. In this transition, antisepsis has not been abandoned, but has developed into its higher form—asepsis. The antiseptic dressing has not been discarded, but has become aseptic. The terms antisepsis—asepsis, are not antagonistic; the one is not the antithesis of the other. "Asepsis is an exalted degree of cleanliness."

It is reached by the surgeon through the aid of antiseptics. The antiseptic agents employed to produce the condition of asepsis may be physical—heat, chemical—carbolic acid, etc., mechanical—washing. These may be supplemented by measures which exclude all bacteria. The aim sought is a condition of freedom of septic material or micro-organisms—asepsis.

The Fundamental Law.—In the transition of surgical practice, which we have noted, the great guiding principle first recognized by Lister has been strengthened, viz.: "that the presence of certain kinds of bacteria is an essential condition of wound infection." From this has been evolved the fundamental law that all materials which are to come in contact with the wound must be free from pathogenic organisms. To prepare a dressing which shall fulfil the requirements of this law would, at first glance, seem to be a simple undertaking. We find, however, that the task is not so easy of accomplishment when we note that over 150 species of bacteria are classed as pathogenic (6 pyogenic); in addition to this we have nearly 300 species of organisms classed as non-pathogenic for lack of information as to their disease-producing power.[1]

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[1] Buchner has shown that many of the common saprophytes classed as non-pathogenic, when injected under the skin, cause local abscess. I have recently witnessed serious results follow an experimental inoculation of a clean wound with mould spores supposed to be harmless.

These bacteria are widely distributed.

"There is no well-defined dividing line between pathogenic and non-pathogenic bacteria."—*Sternberg.*

It would be impossible in the manipulation of dressing material to separate or remove harmless bacteria from those which may be virulent. Therefore, in its practical application the fulfillment of the law demands that surgical dressings shall be free from all forms of bacteria.

All antiseptic agents do not possess the power to destroy or kill organisms. Therefore, dressings impregnated with antiseptics will not, of necessity, meet the demand. Hence, in the preparation of surgical dressings, the law must be construed to mean that, whatever may be the material and whatever may be the methods by which it may be prepared, in order to meet the requirements of surgery, the fundamental principle governing its production must provide that it shall be free from all micro-organisms.

The Infection of Dressings.—The materials which enter into surgical dressings, such as absorbent cotton, gauze, wool, are those which, in themselves, reach after, absorb and hold bacterial life. Every person and every object with which the dressing may come in contact in the course of its preparation, are liable to transfer to it infection. Infection through air is a possible factor.

Micro-organisms are readily disseminated through the air by the medium of dust. The air of a crowded room is always laden with bacterial life. In hospitals, the air is infected through the discharges of patients. The air of a physician's office cannot be kept free from infected dust. The dust on the drug-store counters, tables and shelves will always furnish a luxuriant bacterial garden.

Wherever people move about, they must, of necessity, transfer soil and create dust. If they move from infected centres, as do the inmates and attendants at hospitals, the visitors to the doctor's office or the patrons of a drug store, they spread infected dust.

Dressings may also become infected through the water used in their preparation. The water used upon the dressings should always be that which is boiling or which has been thoroughly boiled.

A greater source of infection arises from contact with the person who handles the dressing in the course of its preparation. Here the clothing of the operator is a possible germ carrier; his body is swarming with bacteria numerous in species, in uncountable num-

bers. Skin, hair and mucous membranes, even of persons who are healthy and of cleanly habits, furnish to bacteria a natural home for growth and multiplication.

In catarrhal conditions, skin disease, or wherever there is an increase of secretions, the bacteria of the body increase both in kind and in number. These sources of infection require more than ordinary attention.

Sterilization of the entire surface of the body is impossible. Yet we are confronted with the fact that the skin secretions, perspiration, dandruff from the hair, all mucous secretions, are a fruitful source of infectious particles, fatal to asepsis if by any chance they should be transferred to the dressing. To even touch an aseptic dressing with hands not disinfected, to touch with prepared hands the eyes, nose, mouth or clothing, and then touch a dressing, would mean that infection would surely follow. Such a procedure would be an unpardonable violation of surgical cleanliness, a crime against asepsis. We must further take into account that the objects within the room where dressings may be prepared, including the air, the walls, furniture, floors, the tables upon which the dressings are laid every piece of apparatus, every object of any nature that may come in contact with the dressing, may be the means of transference of germ life. If such objects happen to be of the nature of organic material or those which hold moisture, the more readily do they become carriers of infection.

The maker of surgical dressings must have in mind, therefore, the materials of which the dressings are composed, that they are in their nature absorptive of infectious particles, that all objects connected with, all surrounding conditions, are sources through which infection may be carried to dressings during their handling and manipulation.

The Disinfection of Dressings.—Whatever the term disinfection has been made to mean elsewhere, when applied to surgical dressings it can only mean one thing—destruction of all micro-organisms in or upon the material. This process presents many varying problems. Bacteria show widely varying powers of resistance. Agents which destroy growing forms will not affect the vitality of their spores. The conditions of life and environment are all factors which must be taken into account in the disinfection of dressings. Thus, utensils and objects with smooth surfaces are readily disinfected,

because any bacteria present will be found upon their outer surface; but when bacteria are enclosed in a rock-like mass, as they are in dried dust particles, where we find them surrounded by an almost impenetrable fortress, in dried pus, sweat, in dried secretions or flesh tissue, these organisms are protected by a varnish-like coating. Bacteria, within the fibre of cotton or wool, are enclosed within a cellulose structure. Therefore, in the disinfection of cotton, wool, silk, sponge and catgut, we find that there is presented a varying problem with each material. Chemical reaction is also a factor in disinfection that has been long overlooked. In the disinfection of dressings the nature of the materials and their behavior toward the disinfecting agent must be taken into account. Thus cotton may be disinfected in a solution of soda, but wool thus treated would be destroyed.

Wool may be disinfected in an acid solution, which, in turn, would destroy cotton. Catgut is affected by most chemicals; it is destroyed by moisture. Sponge tissue is affected by many chemicals; it is destroyed by moist heat. Oily substances are impenetrable by watery solutions.

The sole universal disinfectant is fire. It destroys the infection and the infected material. It is applicable to the disinfection of asbestos dressings, which have recently been recommended for surgical purposes. There is no one method or agent which, under all circumstances, will meet all conditions. Generally, more than one agent and several methods of procedure must be used together or in succession.

The writer has made a long series of investigations, having in view the possibility of disinfecting dressings with agents that would have no reaction with the material composing the dressing, that could be readily removed from the dressing, or, when allowed to remain within the dressing material, would have no effect upon wound tissue. In these experiments, such agents as electricity, gases, vapors, friction and pressure were employed.

The general method pursued was to infect fibres with a nutrient fluid containing bacteria, to then subject the infected fibres to the action of the disinfecting agent. The results may be briefly summarized.

Electricity was not effective upon the organisms, except when electrolysis took place, as was the case when water or a solution

of salts was the medium used in the transmission of electrical energy.

Oxygen gas when under pressure had a germicidal effect, especially so when the bacteria were in a moist state. Nascent oxygen was found to be a powerful germicide. Ozone gave similar results, as did oxygen. Carbon dioxide was found to be an inhibitant, but not a germicide. The gaseous oxides of nitrogen, except N_2O were found to be powerful in their action upon bacteria, but destructive to dressing material and productive of great irritation upon inhalation. Sulphur dioxide was found to be germicidal in the presence of moisture, but inapplicable to many classes of the materials used in surgical dressings. Chlorine gas is a disinfectant, especially in its reactions which takes place in the bleaching process, namely, union with hydrogen, and consequent liberation of oxygen.

The bleaching process, therefore, effectually destroys germ life. Iodine and bromine are energetic agents in the presence of moisture, but they react destructively with materials used in surgical dressings. Formaldehyde vapors possess a high power as a germicide. The vapors are highly irritating and destructive to flesh tissue. They are, however, applicable in the disinfection of some classes of material used in dressings, and are utilized in the processes hereinafter outlined.

During the mechanical process of carding cotton and other fibres, the fibres are subjected to prolonged friction, with consequent heat and electrical action. The results upon infected fibre passed through the process were interesting, and the process was found to be one of sterilization.

Experiments numbering many hundreds of series were made to ascertain the value of pressure as a sterilizing agent upon dressing materials. The results show that infected fibres may be sterilized by a pressure of 50 to 100 tons to the square inch. This process has been utilized in the sterilization of certain forms of surgical dressings.

With the discovery of a new species of bacteria there is said to be a new chemical born for its destruction.

But in the present day practice of surgery, only in a few instances, may we use chemical germicides for the disinfection of dressings and allow the chemical to remain in the finished pro-

duct. The active chemical disinfectants are for the most part destructive to dressing fabrics as well as irritating to flesh tissue. Out of the many disinfectants lauded in days past for the impregnation of surgical dressings, but few remain. It has been found that dressings, even when impregnated with antiseptics, may still harbor germ life. In the presence of dry iodoform, dry corrosive sublimate, boric acid, germs will retain their vitality for a great length of time.

Though seemingly a contradiction of terms, it is, nevertheless, a truth born of experience to state that antiseptic dressings may be the means of conveying infection to a wound. Hence, the requirement that antiseptic dressings shall be free from micro-organisms.

In the list of agents applicable to the disinfection of dressing materials, heat ranks first in germ-destroying power. Heated air is precluded for use with cotton and some of the other substances used, for the reason that the temperature required for efficiency is destructive to the material. Heated air is quite inferior in disinfecting power to boiling water and steam. Boiling water almost instantly destroys most forms of germ-life; resistant forms succumb to its action in a few minutes.

Steam, then, holds the first place as a practical agent for the disinfection of surgical dressings. To be effective, it must be saturated (unmixed with air). Saturated or streaming steam circulating under moderate pressure reaches the efficiency and gives the results attained in boiling.

Practical Application.—Having passed in review some of the principles which underlie the preparation of surgical dressings, fitted to fulfil the requirements of surgery, we can best gain an impression as to their practical application by a brief review of the methods instituted by the author, which are now in working operation in the laboratories of Johnson & Johnson, at New Brunswick, N. J.

The buildings set apart for this work were built for this special purpose—made plain and tight to exclude dirt. They are admirably situated away from busy and dusty streets. For miles on either side stretches river and meadow-land, securing an almost dustless atmosphere. In fitting up the rooms in which the manipulations take place, the ideas kept in view were the exclusion of bacteria, easiness of keeping clean.

The walls and ceilings are glass-smooth. The floors are filled and

polished. There are no closets or shelving, no cracks or crevices to harbor dust or dirt. The furniture consists of glass-topped tables with iron frame, allowing effectual and easy cleansing. The principal part of the work is done in the "aseptic room," so called because all things within it are at all times kept surgically clean.

The following is an extract from the rules governing this room:

"Everything outside of this room, everybody and everything passing into this room from the outside are to be regarded as infected until subjected to special cleansing operations.

"Everything required for use in this room, or being brought in, must be sterilized according to the prescribed rules.

"All cleaning, sweeping and dusting must be done at the close of the day's work. Tools, apparatus, towels, aprons, aseptible clothing, etc., are to be sterilized in the sterilizing chambers. The floor must be well moistened before sweeping; dusting must be done with damp cloths. After sweeping and dusting, the covers upon the tables must remain for at least eight hours.

"As often as may be necessary, the entire wood and iron work of the room must be washed with soap and water, then with antiseptic solutions; the room closed and fumigated with sulphur and steam."

Everything, whatsoever may be its nature or history outside of this room, is considered as infected (though, in fact, it may be free from germ life); it is, therefore, disinfected before being taken into the room. The entrance to this room is through an ante-room, which is a disinfecting station of the highest type. Through this quarantine all persons and things pass before entering the aseptic room. The persons who operate in this room are under charge of graduate surgical nurses.

The following extracts from the rules in force show the methods adopted for securing personal cleanliness:

"Every person before entering the aseptic room must put on the prescribed washable garments (flowers, ornaments, jewelry, etc., must be removed). They must thoroughly wash and scrub their hands, forearms and face according to the prescribed rules.

"*Hand Disinfection.*—(1) Scrub hands, face and forearms in a solution of ammonia and soap with a disinfected brush. By the aid of a knife or nail-cleaner, scrape all particles under the nails and on the margins.

"(2) Wash again in ammonia and soap solution, then rinse in clean hot water and dry on a sterilized towel."

After this preliminary washing, operatives must pass at once into the aseptic room. Persons engaged in directly handling dressings must further put on sterilized over-dresses, caps, sleeves, etc., and again wash their hands with soap and ammonia, rinse them in clean

water without drying, rinse in a solution of oxalic acid, finally in soda and alcohol without drying. After this washing, only such objects as have been cleansed and sterilized must be handled unless the hands are rewashed. If for any reason there is cause to leave the room, the sterilized garments must be taken off, and then, before re-entering, both the preliminary and final washing be again performed. Tracing the history of a yard of gauze on its way through these rooms, its course would be somewhat as follows: It is first rendered absorbent and bleached (in an adjoining department) and arrives at the ante-room to be made into dressings. The jars in which it will be packed, with their tops, fastenings, etc., are brought to the same point from a bath in hot soda solution. If the gauze is to be impregnated with antiseptics, it is done in this outer or ante-room. The gauze, the containers, labels and all things pertaining thereto next pass into the sterilizing chamber. This chamber forms a part of the dividing wall between the ante-room and the aseptic room. The chamber is rectangular in form, large enough to hold a wagon-load of goods. It is constructed with thick walls made of metal, asbestos and other non-conducting material. The interior is lined with steam-pipe radiators for producing heated air within the chamber. Doors to the chamber open at both ends, one into the ante-room and the other into the aseptic room. These doors are steam-tight and held in place by ratchet screws.

The chambers are fitted with steam supply and escape connections, gauges for pressure and vacuum, safety valves, exhaust valves, etc. Cars of iron with trays carry the articles to be treated. Supply pipes controlled by valves admit live steam to the interior of the chamber. The actions involved in the operations within the chamber are:

(*a*) Preliminary warming of the materials to prevent condensation.

(*b*) Removal of air.

(*c*) Circulation of saturated steam unmixed with air under pressure through every fibre of the material, subjecting them to the highest possible action of this agent.

(*d*) Subsequent exhaustion of steam and substitution of heated air.

After the gauze passes into this chamber, the doors are closed and it then becomes a hot-air chamber. The air is then exhausted

to a vacuum of 10 or 12 pounds; saturated streaming steam is then let in; the temperature soon rises to possibly 240° F., and the pressure gauge indicates 5 or 10 pounds. The steam pipes are now closed; the vacuum pump is again started until the proper vacuum is obtained.

Again steam is turned on, and so on, in turn, currents of saturated steam follow each other through the vacuum for from one to two hours. Every part of the chamber is penetrated, every fibre is subjected to the action of this highest of bactericides. The most resistant form of germ life must be reached and destroyed. From the sterilizing chamber the gauze passes directly into the aseptic room. In this room, all persons, tables and apparatus having been previously prepared, the dressings are cut, folded and packed in the jars, the covers laid on loosely.

(A large portion of this work is done by apparatus, to avoid touching with the hands.)

This work is rapidly performed, and the filled jars returned to the sterilizing chambers for a re-sterilization. This final sterilization effectually secures absolute safety against the remote possibility of infection by handling. After this final sterilization the jar seals are locked. For dressings packed in jars, this process is one of hermetic sealing, a partial vacuum having been formed within the jars during their heating and cooling. The finished dressings now pass on to be labelled, put in cartoons and made ready for shipment.

These same chambers are utilized for disinfection with formaldehyde vapors, the process being: first heating of the chambers, exhaustion of the air, filling the chamber with formaldehyde vapors, which penetrate every portion of the material; finally, exhaustion of the formaldehyde vapors, which are in turn replaced with heated air.

Sterilization Tests.—The effectiveness of sterilization procedures can be readily confirmed.

In the writer's laboratory the practice is substantially as follows: A portion of the dressing material (for example, a piece of gauze) is impregnated with an infected nutrient fluid. The thus infected material is then dried in air, that the organisms may, as far as possible, be placed in a resistant condition. As a check experiment, a portion of this infected and dried material is placed in sterilized nutrient jelly in the culture chamber. This is done to ascertain whether the test material has surely been infected. The remaining

portion of the infected material is then passed through the sterilization process, care being taken that it passes through like conditions as would the sterilized dressings.

In the case of gauze or cotton, the writer's practice is to wrap the test material in the centre of the package.

In testing catgut ligatures, the ligatures are moistened and untwisted; the infected material is then rolled up within the tissue and dried. After the infected material has passed through the sterilization processes, it is placed in nutrient media in a culture chamber. After a suitable time (at least three days) if a growth is found in the check experiment, we are certain that our test material was infected. If no growth has taken place in the infected material, that has passed through the sterilization processes, we are certain that sterilization has been complete in all the dressings. This conclusion needs no verification. The dressings have been prepared and sterilized by methods which exclude contamination. If a certain portion of material purposely infected, in passing through the sterilization process with them, is rendered sterile, it is conclusive proof that the whole of the dressings cannot fail to be sterile and aseptic.

The above method of procedure applies particularly to dressings containing no chemical antiseptic. Where the dressings are so impregnated, the process is varied as follows:

To avoid the restraining influence of the antiseptic upon the growth of the test organism, portions of the infected material, after passing through the sterilization processes, are placed in quite a large body of liquid nutrient media, which is shaken to dilute the antiseptic below its normal antiseptic potency; to carry this dilution still farther, a few drops from the first dilution are passed on to a second tube of culture media.

It has been found in the use of antiseptics that enough may adhere to the organism (especially to spores) to restrain development, though not destroying their vitality. This is obviated even in the use of strong solutions of an antiseptic by the dilution above mentioned.

In testing with antiseptics the test material is kept under a cultivation for at least a week. Development is often so retarded by the antiseptic tending to make hasty conclusions erroneous. In these tests with antiseptics, liquefied flesh—peptone—gelatine of Koch is usually employed.

Where no antiseptic has been employed, sterilized potatoes and other solid media have been found convenient.

The required test is the presence or absence of a growth which will liquefy solid media or produce form, color or odor characteristic of bacterial colonies.

This is verified when deemed necessary by a microscopical examination. In surgical bacteriology, the bacillus of anthrax is used as the standard test organism; whatever will destroy the vitality of this bacillus will destroy all the known organisms of wound infection.

Who Should Make Surgical Dressings.—In the past, dressing materials were largely the product of domestic industry and convict labor. We could not now tolerate supplies from such disease-breeding sources. In recent discussions by surgical authorities, the question has been raised as to the relative fitness of the surgeon, the pharmacist and the manufacturer as makers and purveyors of surgical materials.

The apostle of modern surgery manufactured "Lister's Gauze" in his own kitchen. Sir Joseph's kitchen is doubtless a more fitting place for such work than is the office of many of his followers. Doctors' offices are not, as a rule, the most wholesome spots. Their upholstered furniture is in constant contact with the clothing and persons of patients carrying infections of every name and kind. Their tapestried carpets are filled with dust brought from pest-laden households. In the doctor's office we will find that tables, shelves, books and apparatus are spattered with debris from urinal examinations, pus from foul sores, dried excretions from diseased skin, pathological tissue, clotted blood and dried discharges from innumerable sources.

Streams of infectious matter continually pour into the rooms of the busy doctor and find a lodging-place in its paraphernalia. The unfitness of such surroundings for the production of surgically clean dressings is evident.

I claim for the American physician the highest of honors. I all but reverence the skill and genius of the American surgeon; but before I would attempt to prepare aseptic dressings in their offices, I should, in most cases, require that they be first cleansed and disinfected upon the lines adopted by health authorities for the purification of infected premises.

A certain hospital claims that its operating room is "the cleanest

place in the world." All hospitals have not earned such a title. Many of them are attached to medical colleges where students and professors gather fresh from the dispensary clinic, from visits to infected houses, from dissecting rooms, from hundreds of sources of contagion.

Clinging to their persons and clothing may be found particles rich in pyogenic and pathogenic bacteria. In hospitals, the aggregation of infectious organisms cannot be avoided. Formerly, they were "hot-beds of infection." Now dangers are excluded only by the most rigorous procedures.

When dressings are prepared by the pharmacist, the work is generally performed in the drug store back room. This place comes far short of the conditions known as surgical cleanliness. The chemically clean graduate is still unclean in the eye of the surgeon. Counters covered with vegetable and animal drugs of all kinds are not suitable places upon which to lay absorbent gauze. Street and store dust, spatterings of syrups, extracts, oils, and all manner of decoctions, create a favorable lodging- and breeding-place for organic life. These are not wanted in surgical dressings. The pharmacist, though ordinarily clean in person and habits, familiar with soap and water in the pursuit of his calling, yet he is far from aseptic. Like the physician, he is constantly in contact with infection through the person of his patrons.

The hands that dispense beef tea at the soda counter, or that bring a jar from a mouldy cellar, should not touch sterilized material without cleansing. Thus there must be a radical change of environment before the pharmacist can attain success in aseptic technique, though he may, perhaps, rightfully claim conditions and facilities that are above those of the ordinary physician.

The facilities of the manufacturer, whose whole organization is adapted to the production of surgical dressings, are certainly more perfect than those of the surgeon, to whom such work is incidental. The environment of a room from which pathogenic organisms and septic matters are entirely excluded is superior to that obtained in the hospital or in the doctor's office. The room in which no work is undertaken except the handling of aseptic material will certainly be more nearly surgically clean than one to which infection has constant access. Persons whose only calling is that of preparing surgical material, who have been schooled in the principles under-

lying the infection and disinfection of dressings, are probably more competent to handle dressings than the doctor's student or his attendants, to whom such work is of necessity relegated. In this work, as in many other instances, properly constructed apparatus is more efficient, more cleanly, more perfect, than hand work.

Further, an organization devoted exclusively to the manufacture of dressings, once having the details arranged to prepare a yard of dressing, can produce any number of yards more perfectly than if done as occasion may require, as is the rule in the hospital or in private practice.

To the manufacturer and dispensing pharmacist is due the credit of having made possible the universal application of the principles of modern surgery. They have supplied to the practitioner in the most remote regions appliances as perfect as those used in the great hospital centres. They have placed in the hands of the practitioner appliances that fulfil every requirement of the advanced art of surgery.

I hold that the preparation, selling and dispensing of medicinal and surgical supplies to the doctor, to the surgeon and to the public belong to pharmacy. Their application is the province of the practitioner of medicine and surgery, and I maintain that it will be to the betterment of surgery to receive all dressing materials from the hands of a competent pharmacist.

Training for the Work.—It is important that persons who are to handle surgical dressings in any capacity be familiar with the principles as well as the details of the work. They should also know why things are done as well as how to do them. The principles of surgical asepsis are applicable to the dispensing and sale of these materials. Therefore, the following epitome of a course in aseptic technique, devised for use in the writer's laboratory, may be found useful to many pharmacists.

In addition to the daily manual training under experienced persons, the operatives are required to attend stated instructions. These instructions are in the form of demonstrations of the processes, with an explanation of the principles involved. Those in attendance are given questions to be answered and experiments to perform. Text and reference books are furnished. The scheme is modeled upon the plan of a college extension course. Among the subjects are the following:

(1) The work of preparing surgical materials, its importance, its requirements.
(2) Definition and meaning of terms.
(3) Nature of the material used in dressings. (Fibres, cloth, ligatures, etc.)
(4) Preparation of materials, bleaching, rendering absorbent, etc.
(5) Kinds of dressings used in modern surgical practice.
(6) Uses to which dressings are put in surgery.
(7) Bacteria, their nature, conditions of growth, multiplication, products of their activity, with demonstrations of the means by which they may be transferred to and from persons and things.
(8) Wound infection.
(9) Infection of dressings.
(10) Disinfection—chemical agents and physical agents.
(11) Exclusion of bacteria.
(12) Sterilization.
(13) Disinfection of persons and things.
(14) Asepsis and aseptic technique in the preparation of dressings.

The entire course in my practice occupies several months—in fact, becomes a continuous course, as additional methods are constantly brought into practice.

Surgical Dressings in Commerce.—Dr. Gerster, in one of his addresses, condemned the use of ready-made products as sold in the drug store, on the ground that the gauge of success is purely commercial, only directed solely to profit.

Another writer affirms that the standard of such dressings is commercial in nature, the essential requisite being profit, and that they must be sold to meet competition. That in this the requirements of surgery are matters of indifference and generally matters of ignorance.

These statements were corroborated in a recent instance by a druggist in one of our large cities, who is commercially wise. He stated that to him quality, kind or make was no factor. Low prices were the sole criterion of value. Responsibility hovers over every field of the pharmacist's activity in dispensing dressings; we share the burden with the surgeon. Whoever has stood beside the surgeon in his operating room and realized how much depended on not only the hand, the training and the skill of the operator, but the absolute cleanliness in every movement, must realize that there are some things that cannot be expressed in a money ratio.

At such a time and in such a place the integrity of the dressing rises to supreme importance. Any neglect in its preparation, any misstep through the ignorance, cupidity and stupidity of any who

have had to do in its history, is sure to be revealed. The issue of life or death in such a case should not be subject to the market rates per pound or yard. What results must follow the very common practice of dispensers who open packages of dressings, measure and weigh them over dusty counters with unclean hands, and send them on their mission? It would be more humane, perhaps, to send a lethal dose of strychnine. In the light of asepsis, to dispense morphine for quinine becomes a virtue when compared with the wilful contamination of a surgical dressing.

Poisons are put under lock and key, dispensed under rigid systems of precaution and checking.

The importance of the surgical dressing, the nature of its requirements, call for equal care. There is no article in the druggist's stock which should receive greater care and judgment. Upon every yard of gauze, sponge or ligature he dispenses hangs, perhaps, the life and death of a patient and the reputation of a surgeon. They should be guarded from every channel of direct or indirect infection.

A closet or a room, or a case should be provided for their reception that is cleanable; it should be cleaned often and kept clean. They should be sold within the containers in which they are packed in their preparation. They should never be broken open for sale or for any other purpose. They should be delivered to the surgeon so perfect that there can be no question as to their integrity, placing all the responsibility for their subsequent care in his hands. In dispensing to the public, every purchaser should be cautioned as to their nature and instructed in their handling and use. The price should meet the cost of the dressing plus a profit which will cover this service of advice, trouble and care.

Ninety-five per cent. of the 100,000 physicians in our land who apply these principles of surgery must look to the pharmacist for their dressing materials. In filling this demand, the pharmacist should supply such materials as will meet the highest surgical requirements. As far as the dressing is a factor, the surgeon at the country cross-roads, by the aid of the pharmacist, should be enabled to reach the advanced methods of the metropolitan clinic.

To attain this end in the making, in the buying, in the sale and in the dispensing, even to the most minute detail, there is required knowledge, skill, ability and finally a faithful application of the same.

CHEMICAL ANALYSIS OF THE BARK OF HONEY LOCUST, GLEDITSCHIA TRIACANTHOS.

By Louis P. Carstens, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 160.

The specimen analyzed was obtained in central Pennsylvania. The results of the analysis were as follows:

	Per Cent.
Petroleum Ether Extract:	
Fat, wax, etc.	1·38
Ether Extract:	
Resin, 1·15 per cent.; organic acid, etc.	1·17
Absolute Alcohol Extract:	
Resin, 0·97 per cent.; alkaloid, etc.	1 62
Water Extract:	
Glucose, 0·63 per cent.; saccharose, 0·57 per cent.; mucilage, 2·08 per cent.; dextrin, 1·92 per cent.; etc.	6·51
Alkaline Water Extract:	
Pectin and albuminoids, 4·84 per cent.; etc.	13·68
Acidulated Water Extract:	
Pararabin, etc.	3·62
Lignin	11·76
Cellulose	42·42
Moisture	5·10
Ash	7·00
Loss and undetermined	5·74
Total	100·00

The ash contained potassium, calcium, aluminum and ferric iron, as chlorides, sulphates, carbonates and phosphates.

Starch, tannin and glucosides were not present.

To obtain more of the organic acid and the alkaloid, which were indicated in the proximate analysis, for further examination, about 500 grammes of the ground bark were percolated with 95 per cent. alcohol. After reducing the percolate to a small bulk by distillation, it was diluted with about five times its bulk of distilled water, distinctly acidified with hydrochloric acid, and the mixture filtered. After agitating the filtrate with chloroform, it was made alkaline

with sodium hydrate and again agitated with this solvent. The chloroformic layers were allowed to evaporate spontaneously. The residues were dissolved in alcohol, but failed to crystallize on spontaneous evaporation. The test solutions for alkaloids were then applied to the residue from the chloroform shaken with the alkaline solution, with the following results:

Potassium tri-iodide, no precipitate.
Mayer's solution, precipitate.
Gold chloride, precipitate.
Phospho-tungstic acid, precipitate.
Picric acid, precipitate.
Platinic chloride, precipitate.
Tannic acid, no precipitate.

Two and one-half kilogrammes of the bark, when operated on in the manner described above, furnished a larger quantity of this principle. The residue obtained upon evaporating the chloroform was dissolved in absolute alcohol, and the solution filtered through animal charcoal. The filtrate yielded crystals of the principle when allowed to evaporate spontaneously. The following reagents were applied to these crystals on a porcelain surface:

Sulphuric acid, dark-red color.
Sulphuric and nitric acids, brownish-red color.
Sulphuric acid and potassium bichromate, dark-brown color.
Nitric acid, brownish-red color.
Gold chloride, brown color.

When the crystals were heated with soda-lime, ammonia was evolved.

The substance, removed from the acid filtrate by shaking it with chloroform, was dissolved in absolute alcohol, but failed to crystallize on spontaneous evaporation. Dissolved in water it gave precipitates with the following reagents for organic acids:

Lead acetate, yellow precipitate.
Silver nitrate, dark precipitate.
Ferric chloride, black precipitate.
Potassium bichromate, brown precipitate.
Gold chloride, black precipitate.

France finds her Algerian cork oaks a convenient and satisfactory source of direct revenue. According to a recent official bulletin, the department of Algiers contains 65,000 acres of cork trees in the hands of the Government.—*The Forester.*

ALCOHOL AS A SOURCE OF ERROR IN THE TITRATION OF ALKALOIDS AND ALKALOIDAL RESIDUES.

By Chas. Caspari, Jr.

In August last, the writer presented a paper on the above subject at the Montreal meeting of the American Pharmaceutical Association, but not content with the results detailed therein, decided, upon his return home, to investigate the matter more fully with the view of presenting a second paper on the same subject at the next annual meeting. Such a paper has been made unnecessary by the publication of an article, written by Mr. L. F. Kebler, in the December, 1896, issue of the American Journal of Pharmacy, wherein is demonstrated the fact that *strictly pure* alcohol does not interfere appreciably with the titration of acids by alkalies in the presence of color indicators, except in the case of methyl orange and a few others. Having carried out a series of titrations with *strictly pure* alcohol prepared by himself, using hæmatoxylin, Brazil wood and cochineal as indicators, the writer desires herewith to corroborate the statements made by Mr. Kebler, that satisfactory results can be obtained with *such* alcohol quite as well as with water.

The writer, in his paper (see American Journal of Pharmacy, September, 1896, p. 473), called attention to the fact that alcohol and absolute alcohol, as available in the market, exercise a decided influence on color indicators and may prove the fruitful source of error in volumetric work, the statement being supported by a large number of tabulated results obtained in actual work. This was probably the first time that attention had been publicly called to this matter, and inquiry made at the time of several leading pharmacists and chemists failed to elicit any information or experimental data. The absolute alcohol used in the writer's experiments last summer and stated to have a slight alkaline reaction was of E. R. Squibb & Sons' manufacture, and taken from a fresh bottle. That the error liable to occur from the use of commercial alcohol will be greater or less in proportion to the impurities present in the alcohol is, of course, true, and the question arises: Has *strictly pure* alcohol always been used in volumetric work, and have analysts been in the habit of preparing it specially for such work, the market (at least to the writer's knowledge) not providing the article? The chairman of the Committee on Indi-

cators of the American Pharmaceutical Association, Mr. Kebler, in his instructions to the committee last winter, directed the use of alcohol, but failed to note his experience of eighteen months ago (see AMERICAN JOURNAL OF PHARMACY, 1896, p. 667), nor did he caution the members against the use of commercial alcohol. Did he assume that all would use *strictly pure* alcohol, and did he use *such* alcohol in his own work done for the committee? This fact should have been noted in the committee's report.

The explanation offered in the writer's paper for the peculiar behavior of alcohol, on the basis of electrolytic dissociation, was made on the assumption that high-grade commercial alcohol, known as cologne spirit, could scarcely be so impure as to account for the great disturbance observed, especially as the alcohol employed corresponded quite well with pharmacopœial requirements, and since Ostwald has directed attention to the action of alcohol on color indicators. Even now, when using strictly pure alcohol, the writer has observed that in a mixture of only alcohol and indicator a *much larger* (two to four fold) quantity of alkali solution is required for the characteristic reaction than in a mixture of only distilled water and indicator; moreover, the same peculiar behavior towards tropæolin was observed as recorded in the writer's paper, for 50 c.c. strictly pure alcohol with 3 drops of a very sensitive tropæolin solution failed to show a decided acid reaction after addition of 4·5 c.c. $\frac{N}{10}$ H_2SO_4. This latter circumstance, while confirming the unfitness of tropæolin as an indicator for *alcoholic* titrations, requires further investigation.

While the writer regrets his misapprehension of the causes leading to the observations mentioned in his paper of last August, and although the conclusions then arrived at have now been shown to be partly erroneous, both by experiments in his own hands and by the recently published reports of Mr. Kebler, one good result has at least been obtained, namely, to show the wholly unreliable character of commercial alcohol for volumetric work and to direct the attention of pharmacists and others prominently to this fact, and to the necessity for purifying all alcohol intended for such work.

BALTIMORE, December 17, 1896.

A RÉSUMÉ OF RECURRENT TOPICS.

By William B. Thompson.

The Avoirdupois of Odors.—The ingenious are never idle. There need be but few lost moments to the industrious mind. The power, volume, weight of odors can be relatively compared, it is claimed, by the amount of organic matter obtainable by reducing this to condensation and solution. Dense and heavy odors must assail the nerve filaments in our nasal organ with a ponderosity greater than those of a lighter or more ethereal kind. Experiments may be made by thoroughly impregnating the warmed and dried air of a closet or compartment with a chosen odor. Something is certainly diffused when our sense detects. What is it to be thus appreciable? Is it organic matter? This being granted, it must have weight. After a prolonged diffusion of the odor in the air of the closet or room, it is suddenly filled with the vapor of water, and finally cooled, when the condensate is collected. This is to be examined for amount of organic matter, and comparisons instituted. The actual utility of this does not appear except in the light of scientific interest; ordinary tests are all physical. We may, however, desire to know whether the volume of natural odor in the plant species can be intensified by natural means. The power and diffusiveness of fragrance must have a basis of considerable materiality to be so permanent and enduring. Does it exist there as we recognize it, or is it not rather the result of the subtle chemistry in which the oxygen plays the most important part?

Eucaine.—This new therapeutic, similar to cocaine, is a laboratory, not a vegetable, product. Sixty-seven letters are required to constitute its correct scientific orthography. An abbreviated prescription for such an article will not be criticized for ambiguity. The derivation of eucaine would seem to invest it with an antiseptic character. Its solubility in aqueous media is very free. It does not present that tendency to fermentative change or to decomposition as many vegetable alkaloids in solution are prone to do. Some observations have been made as to the comparative toxic effect with cocaine, eucaine being less, and its onset and intensity less. The pharmaceutical preparations will include an ointment, but its chief uses will be those of a mydriatic, and as an anæsthetic (10 per cent. solution) in minor dental surgery. Its composition is said to

be very complex, and its preparation difficult. The pharmacology of eucaine, however, is well worthy of attention.

Resemblance with Difference.—The realm of nature abounds in curious creations, and a fanciful imagination can help many comparisons. But with all these freaks, or, to be more reverent, designs, these objects would almost seem to present the appearance of art assisting nature. For instance, the fly-orchis, Ophrys muscifera, and the bee-orchis, Ophrys apifera, produce flowers, the parts of which bear a very close resemblance to the body forms of these insects respectively. Then we have, in the mandrake and the ginseng, forms which require very slight additions to parts to complete the figure of human shape. The poetic fancy has given us a tradition that the ploughman stood aghast as his blade threw upon the surface the rooted mandrake with its human feet and hands! Minerals are often observed to possess outlines of figures which might be mistaken for exquisite chiseling.

Professional Compensation.—There seems to exist a somewhat fixed law of compensation in almost all affairs except those of human agency, and even there, if we look carefully into the subject, will be found causes for which we ourselves are directly responsible. We honor the individual who honors himself; we respect the man who gives evidence of an innate self-respect, especially in a professional character. That man who degrades the value of a prescription down to that point of a commercial bartering standard creates a torment which will return to plague him all the remaining days of his business life. There should be no autocratic rates on prescriptions; but there should be a just and fair compensation when all the elements of expense are duly considered. Some estimates have been given as to what should be a fair basis of calculation in attaching the value, commercially and scientifically, to a physician's prescription. The value to the patient may be incalculable; but this is never computed. A curative compound is of inestimable worth to illness, suffering and pain. And when the compounder is justly rewarded for his knowledge, skill and science, what a twopenny comparison is the cost of the remedy to the man's or woman's health, strength and enjoyment of life! This is the way in which the public should be educated to view it. In the meanwhile, let no reputable pharmacist consent to gauge the value of a presented prescription by the price to which some mercenary competitor, some commercial

apothecary, whose existence is made possible by our loose, lax laws, has degraded it and himself. The value of the service in compounding a prescription, omitting the cost of material, bears the just ratio of 50 per cent. of the *price charged*, yet what a dignified recompense on a *ten-cent* prescription!

Fruits and Juices.—Those who are in the habit of observing may often wonder why tropical fruits are so much less perishable than those grown in temperate regions. The first impression is that the high degrees of heat and the strong, direct light would both conduce to relaxed tissue and vapid juice; yet exactly the reverse of this is true. The provision which guards against this, and so wisely adjusts the productions to the clime, is seen in the structure of the orange and the lemon. The volatile oil and fixed oils, which exist in the pellicle of the rind, absorb and check the penetrative power of the heat, whilst the soft, white substance, the inner pulpy coating, is as good a barrier against both cold and heat as the fur on an animal's body or the soft down on the bird's breast. As the result of this the orange species, when uninjured in the picking and handling, can be carried, without deteriorating, to great distances and to all varieties of climate.

How very different is the case with our Northern berries and fruits! But few of these, if any, will keep their flavor for forty-eight hours, and none of them retain their form for any considerable duration of time. Another curious and striking fact is that the juices of tropical fruits are all of a cool temperature in the native or natural state, being shielded from vicissitudes. The milky juice of the cocoanut is of an even temperature, refreshingly cool, being well protected in that dermic *coire*, or skin, which is between the outer shell and the meat of the fruit. Then again, our now indigenous watermelon gets an abundance of sweet juice and retains it, no matter how dry and arid may be the soil of its habitat, the largest—and much the finest—variety of these fruits being grown in the Indian Desert, between the valley of the Indus and the Ganges, where not a drop of water falls from the clouds during the annual cycle, and the rainy monsoon often passes over the region without shedding one sympathetic tear of moisture upon the parched soil; yet the melon secures its quota of sweet, watery juice, and keeps it, under its varnished rind, comparatively cool. Verily, before the magic of Nature, the feats of art and legerdemain are insignificant!

CINCHONA CULTIVATION IN BENGAL.[1]

The Thirty-fourth Annual Report of the Cinchona Plantations of the Government of India in British Sikkim and Bhutan has lately been submitted to the Bengal Government by Dr. George King, C.I.E., F.R.S, Superintendent of the Royal Botanic Garden, Calcutta, and of cinchona cultivation in Bengal, and Government quinologist.

The number of trees uprooted for their bark during the year 1895–96 was 453,000, comprising 65,000 of C. succirubra, used for the manufacture of "Government Cinchona Febrifuge," and 388,000 of the kinds which yield yellow or quinine-producing bark chiefly hybrid cinchona and Calisaya ledgeriana, a large proportion of the trees uprooted being small. The number of plants was increased during the year by 9,200 hybrids; the total census of living cinchona plants at the close of the year, including nursery stock, was 3,807,701.

The crop collected during the year amounted to 467,190 pounds of dry bark, consisting of 53,380 pounds of red and 413,810 pounds of yellow bark. The whole of this crop, with the exception of 790¼ pounds supplied to the Government Medical Stores Department or sold to Government institutions, was made over to the cinchona factory for manufacture into quinine and febrifuge. In addition to the bark cropped at the Government plantations, 170,000 pounds of quinine-yielding bark was purchased from private cultivators in the district. Seventy-four thousand pounds of red bark, worked up in the factory during the year, yielded 3,124 pounds of cinchona febrifuge, valued at Rs. 10 (about 12s.) per pound, and from 387,200 pounds of yellow bark, 9,004 pounds of quinine sulphate, valued at Rs. 14 (about 16s.) per pound, were manufactured. An additional 1,500 pounds of quinine were purchased from the quinine factory of the Madras Government at Ootacamund, in order to meet the greatly increased demand for the 5-grain packets, which are issued to the people at all post-offices throughout the province, at the rate of 1 pice each (less than a farthing).

The total issue of quinine for the year amounted to 10,287 pounds, an increase of 2,725 pounds on the previous year, 1,145 pounds of this increase being due to the growth of the post-office

[1] *Pharmaceutical Journal*, October 17, 1896.

demand for pice-packets, and 937 pounds issued on account of the Chitral expedition. Of cinchona febrifuge there were issued during the year 3,830 pounds, 554 pounds more than in the previous year, the amount purchased by the public having increased by 194 pounds, showing that the preparation is held in high estimation by the public as a cheap and reliable remedy for fever, notwithstanding that cinchonidine and cinchonine can be purchased at a cheaper rate in the Calcutta bazaar. The febrifuge is an unbleached quinetum, and represents the total alkaloids in the bark.

The net profit on the year's operations amounted to Rs. 4,598, a sum which Dr. King says would form but a small dividend on the capital which has been sunk in these plantations since they were first begun. There has not been for many years, however, any capital to pay interest upon, as the cost of the plantations was extinguished long ago by profits made during the early years of the manufacture of cinchona febrifuge. As the Government of India desires only to secure for the people, without loss to itself, a cheap remedy for fever, the Lieutenant-Governor of Bengal considers this result entirely satisfactory. The demand for quinine in the popular 5-grain powders has increased with such rapidity that it has been found necessary to limit the sale to post-offices in Bengal and Assam, and to discontinue the regular supply to other provinces.

The acknowledgments of Government are again accorded to Dr. King and to Mr. G. Gammie, the Deputy Superintendent, for their efficient management of the department during the year.

RECENT LITERATURE RELATING TO PHARMACY.

IODINE MANUFACTURE IN JAPAN. (*Chemist and Druggist, October 24, 609.*)

It is well known that enormous quantities of seaweed containing iodine are gathered along the coasts of Japan, and were it not for the fact that the manufacture of iodine from kelp is scarcely profitable in view of the competition of the Chilian product, Japan would no doubt be one of the principal iodine-producing countries. In fact, even under the present circumstances, Japanese iodine and iodides find a market locally, and have even been seen in Europe in commercial quantities. A proposal has now been made

to the Japanese Government by certain native chemists that the customs duty on iodine and iodides in Japan should be increased to such an extent as to enable the Japanese industry to be self-supporting.—*The Journal of the Society of Chemical Industry, October 31, 1896.*

BARIUM PLATINO CYANIDE.

The text-book way of preparing barium platino cyanide is to pass gaseous hydrocyanic acid through a mixture of platinous chloride 2 parts and barium carbonate 3 parts, suspending in twice their weight of water. Schertel, in a recent issue of *Berichte*, describes a safer process, viz.: Platinum chloride is precipitated by hydrogen sulphide at 60° to 70° C., and the well-washed platinum sulphide is dissolved in a warm solution of potassium cyanide. On evaporation, the potassium platino cyanide ($K_2PtCy_43H_2O$) crystallizes out, and equal parts of potassium sulphide and potassium thiocyanate remain in the mother-liquor. If a solution of barium cyanide be used, the barium platino cyanide is obtained, and from this, by double decomposition with uranium sulphate, the platino cyanide of uranium may be gotten in beautiful crystals.—*The Chemist and Druggist, October 31, 1896.*

PRODUCTION OF QUICKSILVER IN CALIFORNIA.

The Engineering and Mining Journal (New York) states that quicksilver production in California has shown this year a considerable increase, the total receipts at San Francisco for the six months ending with June having been 18,439 flasks, a gain of 4,743 flasks, or 34 6 per cent., over the first half of 1895, and of 6,033 flasks, or 48·7 per cent., over 1894. While these receipts gauge the rate of production very fairly, they do not give the whole amount, as the reports do not include the quicksilver sold directly from the mines, nor that shipped from them to the East by rail, which does not come to San Francisco at all.

The larger output seems to have been absorbed without difficulty. In addition to the greater demand from the California mines, there has been a growth in exports very nearly corresponding to that in the production. The trade with China, which had been suspended for several years, has been renewed, and has aided materially in disposing of the increased production.—*The Journal of the Society of Chemical Industry, October 31, 1896.*

MAPLE SUGAR.

The Production of Maple Sugar, G. H. Grimm (*Cult. and Country Gent.*, 61 (1896), No. 2247, p. 146).—The author urges the necessity of absolute cleanliness in everything connected with the process; the sap should come in contact with tin only; tin spouts should be used; and the buckets should be covered. The sap should be evaporated as soon as possible after it leaves the tree. With suitable apparatus a barrel of sap can be converted into a gallon of syrup weighing 11 pounds in 20 minutes. This syrup will make 8 pounds of sugar. The natural color of the syrup is a translucent white; if it weighs less than 11 pounds per gallon it will ferment; if more, it will crystallize. The syrup is far superior to that from remelted sugar.

In putting it up for the market it should be poured into tin cans at 83° C., and hermetically sealed. It will keep better in an attic than in a cellar, unless the cellar is very dry.

GOLD AND SILVER IN SEA WATER.

Gold and silver in sea-water may not be plentiful enough to warrant the formation of limited companies to extract them, yet those metals exist in the ocean in appreciable amounts. Professor A. Liversidge, in a long paper read before the Royal Society of New South Wales (*vide Chemical News*, Sept. 18, *et seq.*), gives the results of some experiments made with the object of determining the amount of precious metal in the sea-water off the coast of New South Wales. The evidence obtained indicated the presence of gold in the proportion of about 0·5 to 1 grain per ton, or in round numbers from 130 to 260 tons of gold per cubic mile. Assuming that the cubic contents of the whole of the ocean equal 400,000,000 cubic miles, the above proportion would be equivalent to a total amount of 100,000,000,000 tons of gold. With regard to silver, Malaguti obtained 0 0005 gm. from 50 litres of sea-water, representing more than 40 tons per cubic mile. The metal sheathings of vessels have been proved to remove both gold and silver from sea-water, that from one old trader yielding silver, 4 ozs. 15 dwts. 9·2 grs., and gold, 1 dwt. 2·4 grs. per ton, together with a good deal of iodine. Muntz metal sheathings from the piles of wharves have also yielded considerable proportions of both gold and silver.—*Pharmaceutical Journal, October 17, 1896.*

EDITORIAL.

The sixty-eighth volume of the AMERICAN JOURNAL OF PHARMACY, which closed with the December number, contained 708 pages of reading matter and index, and was the largest volume of this journal ever issued. It is but justice to our contributors to say that we believe the quality of the reading matter has never been excelled in previous volumes. Many of the papers called for illustrations, and the call was liberally answered by the publishing committee, so that every number contained one or more illustrated papers.

The present issue opens the sixty-ninth volume with an array of original matter, which we have no hesitation in designating as highly meritorious. Mr. Maiden's paper on red gum is one of the first published in this country on that subject. Mr. Rittenhouse's contribution on the present sources of licorice root contains information derived from first hands; and Mr. LaWall's article calling attention to a new and easily detected sophistication of Japan wax is of the greatest importance. It is no detraction from the other papers that they are not mentioned here, yet we cannot refrain from especially calling attention to the address by Mr. Kilmer on modern surgical dressings, in which the pharmacist will find information about the dispensing of these commodities which should cause him to redouble his vigilance in the direction of cleanliness, and encourage him to insist on the physician ordering such quantities as to enable the dressings to be dispensed without danger of their becoming infected.

THE PATENT MEDICINE ALMANAC.

This is the season of the year when the pharmacist is liberally supplied with almanacs, bearing his own business card, for distribution to his customers. Many fall into the trap, and pass these wretched advertisements on to their customers, and thereby commit a grievous error which injures them in a number of ways.

If every pharmacist who reads this JOURNAL would either return the almanacs to the sender or consign them to the fire, it would, in some sections of the country at least, break up this system of making him the advertising agent of the nostrum manufacturers.

EXIT LUCIUM.

Some three months ago, a new element was announced in monazite sand. It was soon found, however, that the enterprising discoverer had patented it, and proposed to use it in incandescent gas lighting.

Dr. William Crookes, editor of the *Chemical News*, has been supplied with the nitrate and oxalate of the alleged element by the patentee, Mr. P. Barrière, and finds, by spectroscopic and chemical examinations, "that lucium is nothing but impure yttrium."

In the same issue of the *Chemical News*, Dr. R. Fresenius calls attention to the fact that his name had been used in connection with the so-called element without authority.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

INORGANIC CHEMICAL PREPARATIONS. By Frank Hall Thorp, Ph.D., Instructor in Industrial Chemistry in the Massachusetts Institute of Technology. Boston: Ginn & Co., publishers.

We have several excellent small manuals in the English language for the manufacture of organic preparations, such as those of Cohen and Fischer, but this is the first one covering the ground of inorganic chemistry in the same way. It has, moreover, several new and distinctive features which we think are of value. After stating the formula and molecular weight of each compound, it gives the materials and quantities of the same needed for the preparation, and full working directions for the carrying out of the manufacture, followed by the reactions involved and the properties of the product. Under the latter head, the author gives, in a large number of cases, tables showing the solubility of the salt in water at different temperatures, and the specific gravity of solutions of different strengths. For these tables the authorities are invariably given. While the book wants a table of contents, the substances are alphabetically arranged and an index follows.

A valuable introductory chapter on solution, precipitation, filtration, decantation, washing, evaporation and crystallization, abounding in valuable suggestions, has not been overlooked. S. P. S.

THE PRINCIPLES OF THEORETICAL CHEMISTRY, with special reference to the constitution of chemical compounds. By Ira Remsen, Professor of Chemistry in the Johns Hopkins University. Fifth Edition. Lea Brothers & Co., Philadelphia and New York. 1897.

It has been the aim of the author, in the latest edition of this valuable work, to bring it in accord with all the recent advances of chemical science. The salient features of this book are, that it contains a clear statement of theoretical chemistry in a moderate space. It is therefore not so formidable to the beginner as several of the larger works on this subject, yet it contains abundant information to equip the student for almost any amount of research work.

SEMI-ANNUAL REPORT OF SCHIMMEL & CO. (Fritzsche Brothers.) Leipzig and New York: October, 1896.

ON CERTAIN DERIVATIVES OF TRICHLORDINITROBENZOL. By C. Loring Jackson and W. R. Lamar. Reprint from *American Chemical Journal*, October, 1896.

A GUIDE TO THE ORGANIC DRUGS OF THE U. S. PHARMACOPŒIA. By John S. Wright. First Revision, Twelfth Thousand. Indianapolis: Eli Lilly & Co. 1896.

CHEMISTS' AND DRUGGISTS' DIARY for 1897.

BRITISH AND COLONIAL DRUGGISTS' DIARY for 1897.

FOURTH AND FIFTH ANNUAL REPORTS OF THE CALIFORNIA STATE BOARD OF PHARMACY, 1894–96.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 16, 1896.

The regular pharmaceutical meeting of the series of 1896–97 was held in the Museum of the College. Mr. J. W. England presided. The minutes of the previous meeting were allowed to stand as published.

Mr. F. B. Kilmer, of the firm of Johnson & Johnson, of New Brunswick, N. J., was the first speaker on the programme, and addressed the meeting on the subject of "Modern Surgical Dressings." (See page 24.) This address was not only interesting from the technical standpoint, but embodied many valuable suggestions of a practical character. The speaker said that the period marked by the introduction of Sir Joseph Lister's principles of antisepsis was a distinct epoch in the history of surgery. The wound dressings made at the beginning of this epoch were characterized as crude in contrast with those manufactured at the present time. Formerly they were caustic, irritating and non-absorptive, while to-day the essential requirements are power to absorb wound secretion and to exclude infection. The author stated that observations of bacteriological life had determined the value of antiseptic agents, and an interesting feature of his address was his description of the various methods and agents used for making sterilized dressings at the present time. Accompanying the address were samples of present-day surgical dressings, and, by way of comparison, one of gauze cloth that was made in 1887. The speaker said that this sample was the type of the first antiseptic dressing; that in making it cloth was impregnated with wax, rosin and carbolic acid; and that, in the light of present knowledge, it was as antiquated as though it were a thousand years old. Microscopic slides of bacilli and tubes containing cultures of the harmless kinds were also exhibited.

Prof. Joseph P. Remington delivered an address on the "Second Pan-American Medical Congress," which was held in the city of Mexico during the week beginning November 16, 1896. (See page 15.) The speaker defined the purposes of the Congress and gave a concise statement of the work that was accomplished at the recent meeting. The Congress was held under the auspices of the Mexican Government, and all of the entertainments and social features connected therewith were on a magnificent scale. An invitation to hold the next meeting in Caracas, Venezuela, in 1899, was received from the Venezuelan Government, and was accepted. The speaker also related some other incidents of his trip, which were both entertaining and instructive. One thing in particular he spoke of, and that was the harmonious relations existing between this country and Mexico. He believed that more could be done by scientists in strengthening and promoting these relations than by diplomats or politicians.

"Spermaceti" was the subject of a paper presented by Mr. Lyman F. Kebler. About a year ago the author made a chemical examination of a large number of samples of spermaceti, but as a question was raised as to their genuineness, he determined to procure, if possible, samples which would fulfil this requirement. These were accordingly procured, and the results obtained with them agreed in every particular, except that of specific gravity, with those obtained with the previous samples. In the former work but one method was employed for determining the specific gravity, and in the latter several methods

were applied, the figures varying with the method used. The paper was accompanied by specimens, and was the occasion for considerable discussion.

"Murray Red Gum, *Eucalyptus rostrata*, and Its Kino," was the subject of a communication by Mr. J. H. Maiden, Government Botanist at Sydney, New South Wales. (See page 1.) This paper is not only a valuable one from the botanical standpoint, but is of interest as bearing on the commercial and medicinal products of the Australian colonies. In connection with this subject attention was called to the following samples: Syrupus eucalypti rostrati, made from the kino, and recommended as a valuable astringent remedy; Eucalyptus red gum, and samples of oil of several species of eucalyptus. These were sent by Mr. J. Bosisto, of Richmond, Melbourne, who is an honorary member of this College.

Mr. Wm. B. Thompson contributed a paper entitled, "Ferruginous Pills (*Blaud's Pills*)." (See page 17.) The writer suggested examinations of the commercial and extemporaneous preparations for the purpose of ascertaining the precise character of the former, and of determining wherein it differed from the latter. He doubted whether ferrous carbonate was superior in medicinal efficacy to the other compounds of iron formed by the oxidation of this constituent. He thought it was time to stop theorizing, and offered these suggestions for the purpose of stimulating investigation along this line.

"The Commercial Sources of Licorice Root" was the subject of a paper by Mr. H. N. Rittenhouse. (See page 13.) This paper was a concise statement of the sources of commercial licorice root, together with the qualities of the various kinds, and was mainly intended to aid the retail pharmacist in making purchases of the article.

Mr. Chas. H. LaWall contributed the last paper, which was on "Adulterated Japan Wax." (See page 18.) The facts presented by the author were timely, in that they showed to what extent fraud may be perpetrated, and in warning buyers against the efforts of the purveyors of the article to obtain a market for their product. Samples of both the pure and the adulterated Japan wax were shown.

On motion of Professor Trimble, a unanimous vote of thanks was tendered Mr. Kilmer for his interesting address and accompanying specimens.

On motion, the meeting adjourned.

T. S. WIEGAND,
Registrar.

The tenth volume of Professor Sargent's *Silva of North America* was published on the 28th of November. It contains figures and descriptions of the arborescent species of Yucca, which grow north of the Mexican boundary, the Arborescent Palms of the United States, the Cupressineæ and Taxaceæ, and the following genera of Coniferæ: Juniperus, Cupressus (including Chamæcyparis), Thuya, Libocedrus, Sequoia and Taxodium. Two additional volumes will complete the work. The eleventh, now in course of preparation, will be devoted entirely to the genus Pinus, and in the twelfth and final volume will be described the Spruces, Firs, Hemlocks, Larches and a few trees of earlier orders which have been found since the publication of this work was begun. —*Garden and Forest.*

CLASSES

—OF THE—

PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-SIXTH ANNUAL SESSION, 1896-1897.

FIRST YEAR CLASS LIST.

Name.	*Place.*	*State.*	*Preceptor.*
Allen, Milton Deronda,	Medford,	N. J.	D. W. Flemming.
Andrews, Willard Crandall,	Cortland,	O.	
Anstock, Arthur David,	Mahanoy City,	Pa.	L. Oliphant.
Arnott, William,	Wilmington,	Del.	Jos. P. Williams.
Aughinbaugh, John Keely,	Greenvillage,	Pa.	Eberly Bros.
Bachman, Herbert Keck,	S. Bethlehem,	Pa.	Luther Gerhard.
Ball, Clifford Arthur,	Hellertown,	Pa.	Elwood Ball.
Balliet, Howard Paul,	Allentown,	Pa.	John P. Frey.
Bamford, Melvin William,	Reading,	Pa.	R. P. Wilkinson.
Barker, Laura Alice,	Coalport,	Pa.	Dr. Woods.
Barker, Raymond Clark,	Philadelphia,	Pa.	Van Dyke Bros.
Barnett, Eldredge Ewing,	Cape May City,	N. J.	D. C. Guthrie, M.D.
Bayles, John Wickoff,	Mt. Holly,	N. J.	Edward B. Jones.
Bear, Benj. Sam'l Janney,	Mt. Joy,	Pa.	James C. Perry.
Beddow, Llewellyn Jenkins,	Mahanoy City,	Pa.	M. R. Stein.
Blankemeyer, Henry John,	Philadelphia,	Pa.	Kennedy & Burke.
Booth, John Henry,	Philadelphia,	Pa.	Long & Neely.
Bounds, Jesse Vastine,	Wortham,	Tex.	
Bowers, Howard Lewin,	Easton,	Pa.	H. B. Sample & Son.
Brown, James Lawrence,	Philadelphia,	Pa.	R. T. Marshall & Co.
Bulger, Walter John,	Conshohocken,	Pa.	Thos. F. McCoy.
Campbell, William Lester,	Mt. Pleasant	Ia.	Frank L. Kreider.
Chalquest, Gustave Emil,	Morristown,	N. J.	E. A. Carrell.
Chamberlin, William Allen,	Indianapolis,	Ind.	Frank Morse.
Clark, John Edward,	Lock Haven,	Pa.	Franciscus & Co.
Cochran, Harry Barr,	Millerstown,	Pa.	J. C. Altick & Co.
Cockroft, David Holiday,	Philadelphia,	Pa.	Arthur S. Hollopeter.
Collins, Mary O.,	Atlanta,	Ga.	
Crain, Charles Edward,	Springfield,	O.	G. & S. Coblentz.
Crawford, Horace Victor,	Mifflinburg,	Pa.	G. W. Rowland.
Culby, Walter Gibson,	Philadelphia,	Pa.	Joseph Healy.
Curtis, Henry,	Minneapolis,	Minn.	O. J. Thompson, M.D.
Davis, Benjamin Winter,	Camden,	N. J.	Geo. L. Geiger & Co.
Davis, Samuel Bond,	Bridgeton,	N. J.	Reeve & Fithian.
Diehl, George Edward,	Charlestown,	W. Va.	Light & Watson.
Dixon, John Glaspey,	Salem,	N. J.	J. H. Lock, M.D.
Dodson, Henry Malcolm,	Delta,	Pa.	M. L. Holloway.
Doherty, Harry Aloysius,	Atlantic City,	N. J.	F. Elmer Post.
Donnelly, Clarence Eugene,	Bridgeton,	N. J.	F. Seitz, M.D.
Doubler, George Hogen,	Milton,	Pa.	W. H. Galbraith.
Dunn, Edwin Alfred,	Meadville,	Pa.	P. Henry Utech.

Name.	*Place.*	*State.*	*Preceptor.*
Egel, Frederick William,	Bound Brook,	N. J.	Chas. L. Manning..
Engler, Robert Saylor,	Temple,	Pa.	John B. Raser.
Evans, Alex. Cornelius,	Brookhaven,	Miss.	George Dejan.
Evans, Fannie Cheney,	Reading,	Pa.	W. C. Rowe.
Falkenhainer, Charles,	Guttenburg,	Ia.	James Hervey.
Faulhaber, Gustave Adolph,	Loudenville,	O.	Gustav Appenzeller.
Fenner, Harvey Albert,	S. Bethlehem,	Pa.	Campbell & Bro.
Finger, Philip Charles,	Lancaster,	Pa.	J. A. Brown.
Fishburn, Richard Levis,	Lock Haven,	Pa.	Andrew Blair.
Fleming, Arthur Bowles,	Chambersburg,	Pa.	J. S. Barnitz.
Freeman, William Joseph,	Trenton,	N. J.	M. Tidd.
Gasslein, Richard Joseph,	Philadelphia,	Pa.	James J. Ottinger.
Gillan, Charles McDowell,	Chambersburg,	Pa.	P. B. White.
Grady, William Patrick,	Philadelphia,	Pa.	F. W. E. Stedem.
Greisamer, Henry Franklin,	East Greenville,	Pa.	Emil Jungmann.
Gruel, John Edward,	Lancaster,	Pa.	John C. Long, dec'd.
Gryning, John Francis,	Philadelphia,	Pa.	Geo. B. Evans.
Hammond, Nathan Brown,	West Chester,	Pa.	Arthur B. Hammond.
Hance, Howard Ivins,	Philadelphia,	Pa.	R. A. Hance.
Hannum, John Lewis,	Media,	Pa.	W. E. Dickeson.
Harrison, Walter B.,	McKeesport,	Pa.	J. C. Smith.
Hartman, Harry Kessler,	Pensauken,	N. J.	J. W. Kohlerman.
Hartman, Henry Loelke,	Lebanon,	Pa.	Dr. Geo. Ross & Co.
Harvey, Charles John,	Butler,	Pa.	D. H. Waller.
Hays, Samuel Smith,	Greensburg,	Pa.	S. Logan Waltham.
Heckman, John George,	Meadville,	Pa.	J. G. Lindeman.
Heineberg, Alfred,	Selma,	Ala.	Selma Drug Co.
Hess, Percy Dudley,	Syracuse,	N. Y.	J. LeRoy Webber.
Hesse, Frederick William,	Savannah,	Ga.	
Hetrick, Harry Leady,	Altoona,	Pa.	W. M. C. Craine.
Heyke, John Ericson,	Dayton,	O.	C. E. Martin.
Heyl, Charles Ambrose,	Philadelphia,	Pa.	P. M. Kelly, M.D.
Hicks, George Wellington,	Trenton,	N. J.	A. D. Cuskaden.
High, Raymond,	Norristown,	Pa.	W. M. Rickert.
Hill, George Price.	Lansford,	Pa.	W. M. Hill.
Hillan, Joseph James,	St. Clair,	Pa.	John M. Hillan.
Hoagland, Robert John,	Peoria,	Ill.	B. G. Clapham.
Hoch, Quintus,	Philadelphia,	Pa.	Aquila Hoch.
Holland, Albert James Fowler,	Philadelphia,	Pa.	Geo. Holland, M.D.
Holloway, Paul Fundenberg,	Mifflintown,	Pa.	Jos. W. England.
Holt, Edwin Merrimon,	Goldsboro,	N. C.	C. B. Miller.
Hostetter, Harry Jacob,	Reading.	Pa.	Harry Bitler.
Hottenstein, Peter David,	Kutztown,	Pa.	C. L. Shoemaker.
Humma, Osmond Bernard,	Reading,	Pa.	F. X. Wolf.
Hungerbuehler, John Conrad,	Philadelphia,	Pa.	
Hunt, Earl Robert,	Bethlehem,	Pa.	C. E. Keeler.
Huzzard, Kurtz,	Norristown,	Pa.	Eugene Fillman.
Jackson, Charles Henry,	Salem,	N. J.	Harry Lippen.
James, Arthur Bernstein,	Kingston,	N. Y.	J. Wohlgemuth.
Jenkins, David Evans,	Danville,	Pa.	Henry C. Blair.
Kaderly, Eugene John,	New Philadelphia,	O.	
Keiser, Frederick,	Milton,	Pa.	C. Carroll Meyer.
Kelchner, Frederick Victor,	Fleetwood,	Pa.	C. A. Eckels.
Kemp, Lousian Scott,	Dayton,	O.	Justus Schmitt.
Kimberlin, Fred. William,	Norristown,	Pa.	Chas. B. Ashton.
Kincaid, Raymond Keck,	Allentown,	Pa.	Harvey I. Keiper.
Klusmeyer, Henry Chester,	Easton,	Pa.	Fred. L. Mevus.
Koch, Christopher, Jr.,	Philadelphia,	Pa.	C. A. Eckels.
Kraus, Wm. Fred. Constance,	Philadelphia,	Pa.	Otto Kraus.

Name.	*Place.*	*State.*	*Preceptor.*
Krehl, Benjamin,	Titusville,	Pa.	Theo. W. Reuting.
Lacy, Burdett Seldon,	Gloucester,	N. J.	Wm. E. Lee.
Lauer, Julius Paul,	Millersville,	Pa.	C. E. Keeler.
Lawton, Oliver Halton,	Philadelphia,	Pa.	Lawson C. Funk.
Lehman, Charles Luther,	Boiling Springs,	Pa.	R. T. Blackwood.
Lehman, George Theodore,	Portsmouth,	O.	Fisher & Streich.
Leonard, Emma,	Davisville,	Pa.	
Lincoln, John Hamilton,	Bowling Green,	O.	J. C. Lincoln.
Lingle, John McNit,	Bellefonte,	Pa.	F. Potts Green.
Lock, William,	Philadelphia,	Pa.	James Huston.
Longstreet, Chalmer Joseph,	Mexico,	N. Y.	Norval D. Hart.
Love, Thomas B.,	Philadelphia,	Pa.	Bullock & Crenshaw.
Luckenbach, Harry Windfield,	Bethlehem,	Pa.	Simon Rau & Co.
McClure, Richard Ferris,	Wilmington,	Del.	N. B. Danforth.
McCollin, James Garrett,	Philadelphia,	Pa.	Wm. H. Milliken.
McCoy, James Edward,	New York,	N. Y.	H. G. Shinn.
McCullough, Ed. Leonard,	Salladasburg,	Pa.	
McDonnell, Joseph Francis,	Centralia,	Pa.	G. W. Davis.
McElwain, William Thomas,	Chambersburg,	Pa.	Charles D. Keefer.
McFall, John Allen,	Charleston,	S. C.	A. C. McClennan, M.D.
McGarrah, William Henry,	Scranton,	Pa.	F. W. E. Stedem.
McGuire, Thomas Edward,	Mahanoy City,	Pa.	Shenandoah Drug Store.
McKane, Francis Joseph,	Philadelphia,	Pa.	
McKeever, William Henry,	Philadelphia,	Pa.	
MacMurray, Annie,	Upland,	Pa.	Wm. H. Farley.
MacPherran, Ivan LeRoy,	Pittsburg,	Pa.	
Maghee, Griffith Holme,	Rawlins,	Wy.	Thos. G. Maghee, M.D.
Malone, Charles Edward,	Philadelphia,	Pa.	
Mattison, Richard Van Selous, Jr.,	Ambler,	Pa.	R. V. Mattison, M.D.
Meister, Samuel Emil,	Lancaster,	Pa.	James F. Ross
Meredith, Harry Lionel,	Hagerstown,	Md.	D. C. Auginbaugh & Son.
Mervine, Graydon Duncan,	Milton,	Pa.	J. S. Follmer, M.D.
Metzger, Chas. Washington,	Abbottstown,	Pa.	A. Dalton.
Mitchel, Edward,	Philadelphia,	Pa.	E. R. Gatchel.
Mooney, Frank,	Philadelphia,	Pa.	F. Schwartz, M.D.
Mountain, Lloyd Lott,	Confluence,	Pa.	W. S. Mountain, M.D.
Moury, Joseph Daniel,	Shamokin,	Pa.	L. W. Hensyl, M.D.
Mutty, Walter Clement,	South Brewer,	Me.	F. W. E. Stedem.
Nicklas, David Edward,	Chambersburg,	Pa.	J. S. Barnitz.
Norris, Clarence Augustus,	Manasquan,	N. J.	Andrew Blair.
Orf, George Marion,	Philadelphia,	Pa.	
Orr, James Alexander,	Philadelphia,	Pa.	J. V. Slaughter, M.D.
Osterlund, Otto William,	Kinekulle,	Sweden.	Theo. Campbell.
Patrick, William Smith,	Salem,	N. J.	W. Henry Dunn.
Pechin, Edward Charles,	Philadelphia,	Pa.	G. J. Pechin.
Pflieger, Ellwood Keech,	York,	Pa.	Dale, Hart & Co.
Phillips, John Henry,	Redfield,	N. Y.	Wm. H. Phillips.
Pile, Wilson,	Philadelphia,	Pa.	Gustavus Pile.
Popp, Andrew Martin Ralph,	Reading,	Pa.	John B. Raser.
Potts, Samuel Lawrence,	Newtown,	Pa.	Richard W. Livezey.
Price, Arthur Chew,	Wilmington,	Del.	Joseph C. Roberts.
Pullen, Rodney Woolston,	Camden,	N. J.	J. S. Baer, M.D.
Radefeld, Robert,	Philadelphia,	Pa.	Fred. Radefeld.
Rains, Edward Lee,	Memphis,	Tenn.	Jas. S. Robinson.
Ranck, David Walter,	Philadelphia,	Pa.	J. W. Ranck, M.D.
Reice, William,	Bloomsburg,	Pa.	Jas. H. Mercer.
Reigel, M. Calvin,	Linglestown,	Pa.	G. B. Evans.
Reinhart, Robert Lucian,	Shepherdstown,	W. Va.	S. F. Loughridge.

Name.	*Place.*	*State.*	*Preceptor.*
Reynolds, Alver Carroll,	Rising Sun,	Md.	C A. Eckels.
Rhoads Robert Elliott,	Reading,	Pa.	Irvin J. Brandt.
Rice, Albert Ainsworth,	Flemington,	N. J.	Franklin C. Burk.
Robbins, Edward Cruise,	Glassboro,	N. J.	F. G. Thoman.
Roessner, Benjamin,	Philadelphia,	Pa.	Decatur Milligan.
Rogers, Edward Bancroft,	Mt. Holly,	N. J.	Elmer D. Prickitt.
Ross, Dell Noblitt,	Rosemont,	Pa.	Frank W. Prickitt.
Rossell, Edward Wood,	Springfield,	N. J.	Charles B. Mathis.
Ryan, William Stephen,	Philadelphia,	Pa.	Albert D. Forrest.
Sample, James Turner,	Roaring Spring,	Pa.	C. J. Biddle.
Saylor, Byron Centennial,	Annville,	Pa.	Henry T. Hayhurst.
Schreiner, Charles Herman,	Philadelphia,	Pa.	L.W. Hildenbrand, M.D.
Schwaemmle, Fred. Philip,	Philadelphia,	Pa.	E. H. Fienhold.
Seitz, John Alphonsus,	Wilmington,	Del.	Z. James Belt.
Seubert, Charles Aloysius,	Lebanon,	Pa.	John F. Loehle.
Shannon, Samuel Coward,	Philadelphia,	Pa.	D. M. Harris.
Shapiro, Henry,	Vitebsk,	Russia.	F. W. E. Stedem.
Sheehan, William Henry,	Philadelphia,	Pa.	H M. Campbell.
Shirey, Orville Ludwig,	Chambersburg,	Pa.	Cressler & Keefer.
Shoffner, John Perry,	Norristown,	Pa.	Harry H. Stallman.
Simcox, Howard Leon,	Philadelphia,	Pa.	G. W. Bowen, M.D.
Sipes, Clarence Lessly,	McConnellsburg,	Pa.	W. H. Perkins, M.D.
Skinner, Clarence Russel,	Chambersburg,	Pa.	Samuel E. Wagaman.
Sleifer, Jay Ward,	Philadelphia,	Pa.	J. A. Wamsley, M.D.
Smith, Chas. Elwood Rupert,	Philadelphia,	Pa.	Shoemaker & Busch.
Smith, George Carroll,	Pottstown,	Pa.	C. A. Smith.
Smith, Silas Alfred,	Philadelphia,	Pa.	Wm. McCorkle.
Smith, Wellington Gordon,	Lykens,	Pa.	A. B. Schminky.
Snyder, Herman Hugo,	Philad-lphia,	Pa.	Frank C. Davis.
Stahlé, Robert Nevin,	Gettysburg,	Pa.	Jesse W. Pechin.
Stancill, George Walter,	Selma,	N. C.	G. T. Williams.
Stang, Peter,	Philadelphia,	Pa.	Henry Mueller, M.D.
Steel, Chalmers Alexander,	Huntingdon,	Pa.	H. E. Steel.
Stern, Wilson C. A.,	S. Bethlehem,	Pa.	D. B. Richards, M.D.
Stinson, William Samuel,	Titusville,	Pa.	Geo. B. H. Brown.
Stout, Philip Samuel,	Quakertown,	Pa.	Oliver Stout.
Strode, Richard Clark,	Philadelphia,	Pa.	Funk & Groff.
Suhn, Minnie,	Vitebsk,	Russia.	Marcus Peisakhovitch.
Tanzola, Angelo,	Philadelphia,	Pa.	Victor Michelotti.
Turner, Kenneth Beymer,	Washington,	D. C.	
Turner, Joseph Constant,	Philadelphia,	Pa.	W. F. Steinmetz.
Turner, James Deaver,	Baltimore,	Md.	
Tye, Frank John,	Gordon,	Pa.	J. E. Gregory.
Van Dyke, James Wilber,	Hightstown,	N. J.	H. G. Rue.
Van Senden, James,	Philadelphia,	Pa.	
Wagner, Charles, Jr.,	Philadelphia,	Pa.	J. A. Fajans, M.D.
Waite, William Crigler,	Culpeper,	Va.	R. B. Macoy.
Walters, Fred. Robert,	Philadelphia,	Pa.	
Warrington, Henry,	Philadelphia,	Pa.	C. W. Warrington.
Watson, James Nathaniel,	Elizabethtown,	Pa.	Henry C. Blair.
Weakley, William Stair,	York,	Pa.	J. J. Weakley.
Wehn, Clyde Edwards,	Johnstown,	Pa.	Charles Young.
Wenner, Harvey Eugene,	Allentown,	Pa.	Geo. D. Feidt.
West, Katherine Powell,	Norristown,	Pa.	Jos. C. Roberts.
Wilber, John Arthur,	Malone,	N. Y.	A. A. Allen.
Wolf, Charles,	Philadelphia,	Pa.	S. K. Loder.
Wright, John Franklin,	Cañon City,	Col.	Hunter Palmer.
Wyckoff, Elmer Leroy,	Ithaca,	N. Y.	Fred. H. Blackmer.

Name.	*Place.*	*State.*	*Preceptor.*
Young, Annie Hawkins,	Henderson,	N. C.	Geo. B. Evans.
Zeller, Earl Emanuel,	Mifflinburg,	Pa.	James Kleckner.
Ziegler, Chester Winsor,	Gettysburg,	Pa.	Shinn & Baer.

SECOND YEAR CLASS LIST.—1896-97.

Name.	*Place.*	*State.*	*Preceptor.*
Abrams, Frederick Arthur,	Philadelphia,	Pa.	John Wyeth & Bro.
Albert, Harry Clay,	Maysville,	Ky.	
Albright, Charles Henry,	Philadelphia,	Pa.	John P. Frey.
Anderson, George Charles,	Meadville,	Pa.	A. L. Ballinger.
Baer, Lemuel Miles,	Lancaster,	Pa.	Breidinger & Comber.
Bartholomew, Arthur,	Golden City,	Col.	J. W. Higgins.
Beane, George Ridenour,	Bainbridge,	Pa.	H. C. Blair.
Beardsley, Carolyn Frances,	Chicago,	Ill.	
Berberich, Herman,	Baden,	Germany.	James Moffet.
Berry, Robert Taylor,	Charlestown,	W. Va.	P. H. Franklin.
Beyerle, Charles Wellington,	Bernville,	Pa.	E. M. Boring.
Bishop, David Kerlin,	Mifflintown,	Pa.	W. G. Nebig.
Black, Robert Morris,	Philadelphia,	Pa.	P. M. Kelly, M.D.
Bloor, Alfred Wainright,	Manor,	Tex.	
Booth, Thomas,	Philadelphia,	Pa.	Alexander Wilson.
Brach, Cornelius,	Kerzenheim,	Germany.	W. E. Miller.
Bradford, Edward Burton,	Newport,	N. J.	A. LaDow.
Bready, William Ramsey, Jr.,	Philadelphia,	Pa.	A. J. Frankelberger.
Brennan, Thomas Francis,	New London,	Conn.	W. Higbee Whitcomb.
Brewton, Swain Hoffman,	Cape May City,	N. J.	Wm. Porter.
Brown, Hampton Housman,	Pleasant Grove,	Pa.	B. L. Brown, M.D.
Buckingham, Harry Sheldon,	Clayton,	N. J.	H. G. Shinn.
Calloway, Harry Willis,	Baltimore,	Md.	H. Browning.
Cassel, Oscar Heebner,	Norristown,	Pa.	William Stahler.
Cohen, John Thomas,	Chester,	Pa.	R. H. Henderson.
Coleman, John Edward,	Carbondale,	Pa.	Geo. V. Eddy.
Cooper, Walter Greenlee,	Savannah,	Mo.	J. P. Cooper.
Cox, Linwood,	Norristown,	Pa.	Atwood Yeakle.
Cunningham, Orrick Sim,	Clear Spring,	Md.	George W Hurd.
Dale, David,	Philadelphia,	Pa.	John Wyeth & Bro.
Davis, George Eckley,	Eckley,	Pa.	Charles J. Schneider.
DeBeust, William Hare,	Philadelphia,	Pa.	R. H. DeBeust, M.D.
Decker, William Robert,	York,	Pa.	R. Wm. Ziegler.
DeHaven, Ida Valeria,	Bayonne,	N. J.	
Dirmitt, Charles Walter,	Philadelphia,	Pa.	C. H. Dirmitt, M.D.
Downing, William Henry,	Wilmington,	Del.	N. B. Danforth.
Dubell, Alexander,	Mt. Holly,	N. J.	R. C. Barrington.
Eason, David Clark,	Brookville,	Pa.	Shinn & Baer.
Estlack, Walter Forrest,	Philadelphia,	Pa.	H. W. Estlack.
Evans, Abner Thomas,	Greensburg,	Pa.	S. P. Brown.
Evans, Samuel, Jr.,	Circleville,	O.	Evans & Kimmel.
Farrow, Frederick Reeves,	Philadelphia,	Pa.	Eberly Bros.
Felty, Harvey Long,	Palmyra,	Pa.	A. C. Hersh.
Fisher, Samuel Keim,	Lititz,	Pa.	J. C. Brobst, M.D.
Fleming, John Halbert,	Media,	Pa.	A. W. Smedley, dec'd.
Foltz, Edgar Daniel Grant,	Bethlehem,	Pa.	N. B. Danforth.
Friebely, Harry Eugene,	S. Bethlehem,	Pa.	H. A Burkhart, M.D.
Funk, Robert Rowland,	Hagerstown,	Md.	Blew & Lucas.

Name.	*Place.*	*State.*	*Preceptor.*
Gage, Porcius Silkman,	Vineland,	N. J.	
Geiger, Edward George,	Peoria,	Ill.	F. H. Vonachen.
Gibb, Andrew,	Lock Haven,	Pa.	W. C. Franciscus.
Gladhill, James White,	Jersey Shore,	Pa.	George M. Beringer.
Greer, Mary C.,	Philadelphia,	Pa.	E. H. Richardson, M.D.
Groff, Harry Musselman,	Lancaster,	Pa.	C. W. Warrington.
Groff, William,	Quarryville,	Pa.	T. M. Rohrer, M.D.
Grunden, Percival Edward,	Steelton,	Pa.	G. A. Gorgas.
Guth, Herbert Wallace,	Allentown,	Pa.	Peters & Smith.
Haus, Ralph Leonard,	Mifflinburg,	Pa.	W. H. F. Vandegrift.
Heintzelman, Joseph August,	Philadelphia,	Pa.	Jos. A. Heintzelman.
Helmbold, Anna Palmer,	Philadelphia,	Pa.	F. W. E. Stedem.
Heverly, Frederick Chase,	Wilkes-Barre,	Pa.	R. D. Williams.
Hoffman, William Anthony,	Renovo,	Pa.	E. T. Swain.
Hubbert, William Ernest,	Hico,	Texas.	W. E. Hubbert.
Hudson, Harry, Jr.,	Philadelphia,	Pa.	Wm. C. Walter.
Hukill, Oscar K.,	Hot Springs,	Ark.	Andrew Blair.
Huntington, Joseph,	Philadelphia,	Pa.	J. C. Perry.
Jenkins, Frank Huston,	Hanover,	Pa.	J. L. Emlet.
Joffe, Jacob Leopold,	Kovno,	Russia.	E. J. Lupin.
Kain, John Kauffman,	York,	Pa.	J. B. Kain, M.D.
Keen, George Carll,	Vineland,	N. J.	J. J. Ottinger.
Keen, Geo. Samuel Jacob,	Wiconisco,	Pa.	C. D. Christman, M.D.
Keenan, John Joseph,	Philadelphia,	Pa.	J. J. Burk.
Keim, Joseph Paxson,	Bristol,	Pa.	Emlen Martin.
Kepner, Weldon Stover,	Shippensburg,	Pa.	J. C. Altick & Co.
King, James David,	Easton,	Pa.	Rowland Willard.
Kintzer, Harry Augustus,	Womelsdorf,	Pa.	F. T. Landis.
Kirby, Frank Brennand,	Philadelphia,	Pa.	Lawson C. Funk.
Kohl, George Michner, Jr.,	Jenkintown,	Pa.	Thos C. Coltman.
Krewson, William Egbert, Jr.,	Philadelphia,	Pa.	Wm. E Krewson.
Kyser, George Herbert,	Richmond.	Ala.	G. W. Kyser.
Latchford, Orwan Luther,	Markelsville,	Pa.	D. H. Ross.
Lee, Walter Evan,	Vineland,	N. J.	Bidwell & Co.
Lefever, John Matthew,	York,	Pa.	S. M. Gable.
Lerch, William Abraham,	Allentown,	Pa.	Peters & Smith.
Levy, Joseph Jacob,	Philadelphia,	Pa.	J. H. B. Amick, M.D.
Lindig, Charles Warren,	Lewisburg,	Pa.	H. N. Hoffman.
Luebert, August Gustav,	Philadelphia,	Pa.	David A. Over.
McCleary, Harry Walter,	Carlisle,	Pa.	J. E. Sipe.
Mahoney, J. Norris,	Bridgeport,	Pa.	E. A. Stahler.
Mathers, Grace,	Philadelphia,	Pa.	Susan Hayhurst, M.D.
Metzler, Walter Scott,	Baltic,	O.	A. S. Metzler, M.D.
Middleton, Claude Ruoff,	Philadelphia,	Pa.	Shinn & Baer.
Miller, William Frederick,	Erie,	Pa.	Wm. Fischer.
Mills, John Leopold,	Cardington,	O.	A. C. Schofield.
Monaghan, Thomas Francis,	Philadelphia,	Pa.	H. D. Stichter, M.D.
Monroe, William Robeson,	Fresno,	Cal.	G. H. Monroe.
Morell, Charles Joseph,	Philadelphia,	Pa.	Chas. M. Morell.
Morgan, Frank William,	Pass Christian,	Miss.	Wm. Greve.
Mountain, Lloyd Lott,	Confluence,	Pa.	W. S. Mountain, M.D.
Ney, Howard Jacob,	Harrisburg,	Pa.	Chas. F. Kramer.
Obear, Josiah Julian,	Winnsboro,	S. C.	O. Y. Owings.
Otto, Glenn Frazier,	La Crosse,	Wis.	Oscar Houck.
Page, George Ralph,	Scranton,	Pa.	Horatio M. Cole.
Parse, Andrew Connet,	Flemington,	N. J.	J. Sherman Cooley.
Perse, James Woodlock,	Plymouth,	Pa.	J. V. Perse.
Pettebone, Thomas J.,	Dorranceton,	Pa.	C. W. Spayd, M.D.
Preston, Gilbert Kent,	Philadelphia,	Pa.	David Preston.

Name.	*Place.*	*State.*	*Preceptor.*
Putt, Milton Thomas,	Lebanon,	Pa.	W. B. Means.
Raker, John Wilson	Pillow,	Pa.	Chas. H. Tatem.
Randolph, Edward Fitts,	Plainfield,	N. J.	L. W. Randolph.
Richardson, James,	Pickering,	Ont.	Geo. Y. Wood.
Ringer, Lewis Johnson,	Hagerstown,	Md.	M. L. Byers & Co.
Rinker, Henry Paul,	Hellertown,	Pa.	C. W. Albright.
Ritz, Charles August,	Ashland,	Pa.	A. Schoenenberger.
Roberts, DeWilton Smith,	Norristown,	Pa.	O. F. Lenhardt.
Rose, Frank,	Philadelphia,	Pa.	G. W. Bowen.
Ross, Annie Catherine,	Philadelphia,	Pa.	W. E. Supplee.
Sausser, Howard Elmer,	Schuylkill Haven,	Pa.	John B. Raser.
Schlauch, Theodore Storb,	New Holland,	Pa.	C. J. Seltzer.
Scott, Emma Love,	Richmond,	Va.	Susan Hayhurst, M.D.
Seiberling, Joseph Dallas,	Hynemansville,	Pa.	Frank Morse.
Sheitz, Lloyd A.,	York,	Pa.	Harry A. Hay.
Shemp, Russell Nicholas,	Philadelphia,	Pa.	W. E. Supplee & Bro.
Shwab, George Augustus,	Nashville,	Tenn.	
Sieber, Isaac Grafton,	Harrisburg,	Pa.	J. Wilson Hoffa.
Slobodkin, Rose,	Minsk,	Russia.	Susan Hayhurst, M.D.
Smith, Alfred Homer,	Smyrna,	Del.	Wm. F. Dunn.
Smith, Benjamin James,	Trenton,	N. J.	Aquila Hoch
Snavely, Clarence Osborne,	Lebanon,	Pa.	Wm. G. Shugar.
Snyder, John Paul,	Lancaster,	Pa.	W. T. Hock.
Steinmetz, William Baer,	Ephrata,	Pa.	G. S. Royer.
Stimus, Howard George,	Moorestown,	N. J.	G. H. Wilkinson.
Stokien, Francis Joseph,	Charleston,	S. C.	R. P. Wilkinson.
Stott, Horatio Allen,	Coatesville,	Pa.	W. S. Young.
Strawinski, Jacob Franklin,	York,	Pa.	Dale, Hart & Co.
Swartley, Harry Mahlon,	Philadelphia,	Pa.	F. P. Streeper.
Thomas, Frank Hartwell,	Valdosta,	Ga.	
Thompson, Henry Kirk,	Titusville,	Pa.	R. C. Cadmus.
Thompson, Harry Merril,	Selins Grove,	Pa.	T. C. Tomlinson.
Tomlinson, George Walton,	Rydal,	Pa.	S. T. Hamberg.
Troth, Ernest Augustine,	Palmyra,	N. J.	Shoemaker & Busch.
Tyler, William Walston,	Onancock,	Va.	George B. Evans.
Underwood, James Harris,	Woodbury,	N. J.	W. S. Reeve.
Waldner, Herman Theodore,	Ashland,	Pa.	T. H. Strouse.
Walter, William Bell,	Gettysburg,	Pa.	H. C. Blair.
Wilt, Geo. Washington, Jr.,	Flemingsburg,	Ky.	John J. Reynolds.
Winkler, Oscar Charles,	Philadelphia,	Pa	Milton S. Apple.
Winslow, John Hayes,	Vineland,	N. J.	A. C. Taylor.
Wiza, Joseph Louis,	Philadelphia,	Pa.	A. A. Poehner.
Zane, William Spence,	Seabright,	N. J.	G. B. Minton.
Zimmerman, Thos. Edmonds,	Carlisle,	Pa.	B. F. Emrick.

SENIOR CLASS LIST.—1896-97.

Name.	*Place.*	*State.*	*Preceptor.*
Althouse, Harry B.,	Harrisburg,	Pa.	F. J. Althouse.
Anderson, Ralph,	Latrobe,	Pa.	R. T. Blackwood.
Baker, Newton Claire,	Sunbury,	Pa.	Charles Leedom.
Barth, Charles,	Philadelphia,	Pa.	W G. Nebig.
Bartholomew, Claude Lafayette,	Bath,	Pa.	Peters & Smith.
Bates, John Phillips,	Mansfield,	Pa.	J. M. Smith.
Becht, Frederick,	Philadelphia,	Pa.	Bullock & Crenshaw.
Beh, Edward,	Philadelphia,	Pa.	David J. Reese.

Name.	*Place.*	*State.*	*Preceptor.*
Breithaupt, Alphons Peter,	Philadelphia,	Pa.	George H. Ochse.
Brown, Roscoe James,	Oxford,	Pa.	W. T. J. Brown.
Brueckmann, Walter,	Philadelphia,	Pa.	E. W. Herrmann.
Brumbaugh, Albert Sylvester,	Mansfield,	O.	Silas Shull.
Carson, James Thompson,	Philadelphia,	Pa.	Dr. Meredith.
Clapp, Samuel Clarence, Jr.,	Milton,	Pa.	C. E. Stout.
Clark, Edward B ,	Reading,	Pa.	F. X. Wolf.
Clark, Robert Hall,	Union City,	Ind.	J. P. Frey.
Cloud, Norman Henderson,	West Chester,	Pa.	Luther Gerhard.
Codori, Simon Jacob, Jr.,	Gettysburg,	Pa.	J. M. Hillan.
Compton, Richard Hal,	Allen,	Tex.	Geo. F. McKinstry.
Cooper, Morris,	Friedensburg,	Pa.	G. D. Borton.
Cope, Edward Kreidler,	Philadelphia,	Pa.	F. H. Cope.
Cornell. Horace Hogeland,	Newtown,	Pa.	Robert Glenk.
Craig, Ralph Butz,	Allentown,	Pa.	Kennedy & Burke.
Criswell, Edward Ott,	Waynesboro,	Pa.	J. W. Harrigan.
Deibert, William Henry,	Northampton,	Pa.	J. H. Stermer.
Eckels, Frank Huston,	Carlisle,	Pa.	J. B. Moore.
Eddy, Volora Doolittle,	S. Chester,	Pa.	A. L. Castle.
Entwistle, Albert Henry,	Philadelphia,	Pa.	Chas. H. Roberts.
Eschbach, Clarence Derbie,	Milton,	Pa.	John S. Follmer, M.D.
Failing, William Clark,	Albany,	N. Y.	H. C. Blair.
Farley, Levi James,	Chester,	Pa.	Wm. H. Farley.
Few, Colin Spangler,	Middletown,	Pa.	Geo. B. Evans.
Filer, Burritt Boynton,	Hammonton,	N. J.	J. F. Meade, M.D.
Frederici, John Koch,	Auburn,	Pa.	E. F. Haenchen.
Funches, Cardoza Marion,	Rowesville,	S. C.	J. M. Hillan.
Garrison, Joseph Miller, Jr.,	Elmer,	N. J.	Theodore Campbell.
Gessford, Otice Eugene,	Lippincott,	Pa.	Funk & Groff.
Godshall, Samuel R.,	Soudertown,	Pa.	Smith, Kline & French Co.
Goodfellow, Charles Rumney,	Philadelphia,	Pa.	E. M. Wallington & Co.
Grakelow, Ralph,	Tower City,	Pa.	Ira P. Amick.
Gross, Paul Herbert,	York,	Pa.	R. Wm. Ziegler.
Harry, Hamilton Maxwell,	Conshohocken,	Pa.	Jas. W. Harry.
Hebden, William,	Philadelphia,	Pa.	Caleb Scattergood.
Heim, Christian, Jr.,	Philadelphia,	Pa.	Henry Mueller, M.D.
Hildebrand, Howard Ovid,	York,	Pa.	A. H. Lafean & Bro.
Hill, William Maurice,	Lansford,	Pa.	Wm M. Hill.
Hoffman, William Shalter,	Danville,	Pa.	G. C. Devine.
Hörst, Harry Lewis,	Lock Haven,	Pa.	T. C. Hilton & Co.
Hostelley, John Jos. Francis,	Collingdale,	Pa.	T. W. Hargreaves.
Howard, Horace Emory,	S. Hadley,	Mass.	J. J. Ottinger.
Howell, Harvey Field,	Easton,	Pa.	Geo. B. Evans.
Hundertmark, John Charles,	Cleveland,	O.	Acker Bros.
Ingling, Howard Edgar,	Riverton,	N. J.	Milton Cowperthwaite.
Jacoby, William Lawless,	Philadelphia,	Pa.	Bullock & Crenshaw.
Jaeger, Charles Frederick,	Philadelphia,	Pa.	E. E. Bostick.
Janisch, Frederick Wm.,	Philadelphia,	Pa.	F. H. Davis.
Jefferis, David Strode,	Philadelphia,	Pa.	Funk & Groff.
Jennings, Isaac Astor,	Philadelphia,	Pa.	Theodore Campbell.
Johns, Frank James,	Pleasant Mount,	Pa.	H. C. Blair.
Jolley, John James,	Philadelphia,	Pa.	F. M. Apple.
Kessler, Lawrence Anthony,	Logan,	O.	E. F. Kessler.
Kirlin, Chas. Coleman Hagenbach	Shenandoah,	Pa.	P. P. D. Kirlin.
Koehler, George,	Philadelphia,	Pa.	E. F. Kaempfer.
Konover, Harold Doble,	Trenton,	N. J.	D. W. Baker.
Kramer, George Henry,	Philadelphia,	Pa.	Robert McNeil.
Kupfer, John Harry,	Butte City,	Mont.	C. W. Newton, M.D.
Langham, John Williams,	Philadelphia,	Pa.	E. B. Kyle.

Name.	*Place.*	*State.*	*Preceptor.*
Laughlin, Albert Russell,	Newville,	Pa.	B. F. Emrick.
Lenhart, Enos Samuel,	Philadelphia,	Pa.	Harry E. Jones.
Levan, Walter,	Numidia,	Pa.	J. E. Gregory.
Lewis, Daniel William,	Catasauqua,	Pa.	Wm. H. Faunce.
Liebert, Charles Frederick,	Philadelphia,	Pa.	A. G. Keller.
Lincoln, George Washington,	Philadelphia,	Pa.	Howard G. Shinn.
Longshaw, Thomas Elmer,	Philadelphia,	Pa.	Henry Sunderland, M.D.
Luhr, Frederick A.,	St. Marys,	Pa.	A. Mulhaupt, M.D.
Lukens, Charles Baker,	Philadelphia,	Pa.	D. A. Over.
MacBride, William Vaughan, Jr.,	Philadelphia,	Pa.	W. F. Seiler.
McGehee, Hanford Bell,	Staunton,	Va.	Lawson C. Funk.
McNeil, Thomas Hunter,	Philadelphia,	Pa.	Robert C. McNeil.
Malin, George Lawrence,	Atlantic City,	N. J.,	Willard Wright, M.D. (dec'd).
Matusow, Harry,	Minsk,	Russia	C. H. Bohn.
Metzler, Claude Dallas,	Harrisonville,	Pa.	J. A. Ferguson.
Morgan, Clayton Edward,	Lynn,	Mass.	Frank E. Morgan.
Morse, Thomas,	Montgomery,	Ala.	H. G. Eakin.
Mueller, Charles August,	Philadelphia,	Pa.	Alex. G. Keller.
Nebel, Charles William,	Philadelphia,	Pa.	A. S. Hollopeter.
Parry, Edward,	Cramer Hill,	N. J.	W. H. Kensinger.
Parry, William Hough,	Newtown,	Pa.	M. B. Fretz.
Pasold, Julius Martin,	Joliet,	Ill.	H. F. Voshage.
Pearce, Samuel Robert,	Manasquan,	N. J.	Andrew Blair.
Peiffer, Charles Oscar,	Morton,	Pa.	J. M. Sharp.
Peterson, Walter Nickerstaff,	Philadelphia,	Pa.	C. W. Shull.
Pierson, Wm. Harry, Jr.,	Wilmington,	Del.	J. S. Beetem.
Pipes, William Henry,	Millington,	Md.	Dr. Todd.
Praul, Walter Francis,	Philadelphia,	Pa.	J. H. Masholder.
Prosser, David Davis, Jr.,	Hellertown,	Pa.	J. Howard Evans, M.D.
Punt, Arnold Anthony Joseph,	Philadelphia,	Pa.	W. H. Pile & Sons.
Reese, John Bull,	Centralia,	Pa.	Geo. W. Davis.
Reifsnyder, David Ernest,	N. Heidelberg,	Pa.	Wm. E. Donough, M.D.
Rieben, Ernest,	Philadelphia,	Pa.	A. A. G. Starck, M.D.
Robertson, Henry Edward, Jr.,	Philadelphia,	Pa.	Shinn & Baer.
Roth, Fraus Johan,	Lund,	Sweden.	E. W. Sharp.
Rowe, Thomas Maurer,	Reading,	Pa.	B. A. Hertsch.
Seipel, Harry Bertram,	Philadelphia,	Pa.	Leidy Seipel.
Smiley, Geo. Washington,	Philadelphia,	Pa.	E. R. Smiley, M.D.
Smiley, Laura Marguerite,	Philadelphia,	Pa.	E. R. Smiley, M.D.
Smith, Justin Tone,	Windsor,	Vt.	W. A. Rumsey.
Snyder, Harry Lamar,	Annandale,	N. J.	H. A. Nolte.
Stommel, Henry Aloysius Jos.,	Doylestown,	Pa.	E. M. Boring.
Strayer, Otho O'Burn,	Wilmington,	Del.	A. W. Taylor, M.D.
Streeper, Austin,	Norristown,	Pa.	H. R. Stallman.
Swinehart, Daniel Harrison,	Pottstown,	Pa.	L. I. Shuler.
Test, Ellwood Allen,	Philadelphia,	Pa.	John H. Kerr.
Tobias, Isaac Herbert,	Canal Winchester,	O.	Shinn & Baer.
Toelke, Charles,	Philadelphia,	Pa.	Frank E. Morgan.
Troxell, John Isaac Peter,	Allentown,	Pa.	J. E. Bennett, M.D.
Tyson, Warren Sunderland,	Norristown,	Pa.	Atwood Yeakle.
Watson, Joseph Shaffer,	Mt. Holly,	N. J.	Wm F. Simes & Son.
Weber, Howard Elmer,	Mahanoy City,	Pa.	M. R. Stein.
Weiss, Hervey Beale,	Philadelphia,	Pa.	Bullock & Crenshaw.
Weitzel, Sue C.,	Greensburg,	Pa.	Susan Hayhurst, M.D.
Wells, James Ralston, Jr.,	Philadelphia,	Pa.	Bullock & Crenshaw.
Wentzler, Hartman Gotthard,	Muncy,	Pa.	John W. McLeer.
Wetzel, Samuel,	Carlisle,	Pa.	W. F. Horn.
Wilson, Oliver Fawcett,	Pittsburg,	Pa.	E. F. Kessler.
Winger, John Bowman,	Philadelphia,	Pa.	W. L. Hartzell.
Yates, John Julius, Jr.,	Wilmington,	Del.	H. K. Watson.

LIST OF SPECIAL STUDENTS.—1896–97.

Name.	*Place.*	*State.*	*Department.*
Bailey, Esther,	Kieff,	Russia.	Pharmacy.
Carrington, Thos. Spees, M.D.,	Philadelphia,	Pa.	Chemistry.
Case, Luella, Ph.G.,	Delaware,	O.	Chemistry.
Cheney, Millwood C.,	Brooklyn,	N. Y.	Chemistry.
Collings, Walter Nagle,	Philadelphia,	Pa.	Chemistry.
De Graffe, Bertha Leon, Ph.G.,	Albany,	N. Y.	Chemistry.
Frishmuth, H. H.,	Philadelphia,	Pa.	Chemistry.
Heckeroth, William Conard,	Philadelphia,	Pa.	Chemistry.
Hoft, William Irving,	Philadelphia,	Pa.	Chemistry.
Ketterer, Martin, Ph.G.,	Philadelphia,	Pa.	Chemistry.
Kinzey, Calvin Otto,	Cumberland,	Md.	Chemistry.
Krider, C. Richard,	Philadelphia,	Pa.	Chemistry.
Leas, Fred. C., B.S.,	Philadelphia,	Pa.	Chemistry.
Mays, Edmund Anstie,	Philadelphia,	Pa.	Chemistry.
Post, Edward Meigs, Ph.G.,	Chester,	Pa.	Chemistry.
Rowe, William C., Ph.G.,	Philadelphia,	Pa.	Chemistry.
Silverthorn, Alfred P.,	Ridley Park,	Pa.	Chemistry.
Stroup, Freeman Preston, Ph.G.,	Rouseville,	Pa.	Chemistry.
Suhr, Charles Louis,	Oil City,	Pa.	Chemistry.
Toplis, William G., Ph.G.,	Philadelphia,	Pa.	Chemistry.
Tucker, Stephen Allen,	Philadelphia,	Pa.	Chemistry.
White, William Clements,	Philadelphia,	Pa.	Chemistry.